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The AUTOMOBILE

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No. 16

NEW YORK, APRIL 18, 1918

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AUTOMOTIVE INDUSTRIES

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VOL. XXXVIII

NEW YORK—THURSDAY, APRIL 18, 1918—CHICAGO

No. 16

French Engineers Unite in First War Congress

Plans for Post-War Activities Taking Shape—Automobile Standardization
Recommended—Graduated Scale of Import Duties to Follow War—
To Develop Marine Engines

492-FT. AIR TUNNEL FOR AVIATION RECOMMENDED

By W. F. Bradley

PARIS, March 20—The French Congress of Civil Engineers, which was inaugurated in Paris this week in the presence of President Poincaré, is one of the several important and visible indications that the French nation is now seriously tackling the problems of industrial regeneration and commercial competition after the war. Other indications are to be found in the Lyons Trade Fair, bigger and more important than ever; in the Paris Trade Fair, preparations for which are now being made, and, to those who have the opportunity of looking behind the scenes, in the plans laid and in the preliminary work carried out by all the big industrial organizations of the country. During 1915, 1916 and 1917 France had no thought and no spare energies for anything but the war. With 1918 she continues the war without any abatement, but at the same time is laying plans for the industrial struggle bound to come with the return of peace.

Congress Includes Automotive Interests

The Congress of Civil Engineers includes an important section devoted to automotive industries, the commercial automobile, agricultural tractors, motor boats, airplanes, hotel and similar industries interesting the traveler, but is not by any means limited to these industries. It has united all the big industrial organizations of the country, including practically all the leading mechanical and electrical engineering establishments of France, and has as its president M. Mille-

rand, a former Minister of Public Works and of War.

The most prominent note struck by M. Clementel, French Minister of Public Works, at the inauguration of the Congress was that the French Government has decided to give its full support to schemes of standardization in:

- a—ship building,
- b—railroad construction,
- c—specifications of metals used on Government contracts.

Government Follows Work Closely

The various Government departments are closely following the work of the Congress, and arrangements have been made whereby all the decisions arrived at shall be transmitted to a legislative section of the Congress which will be entrusted with the task of preparing them in the form of proposed laws or decrees ready for presentation to Parliament. In this way there is every possibility of the work of the Congress resulting in more than platonic votes.

From the standpoint of the automotive industries the most important report presented to the Congress was that of G. Lumet, who occupies the position of chief engineer of the Automobile Club of France laboratory and will be remembered as the officer sent to America in 1914 to make the first purchases of automobile trucks for the French army.

M. Lumet dealt with the situation of the automobile

industry after the war and laid particular stress on the necessity for standardization, especially with regard to metals. There is not in France any organization corresponding to the S. A. E. in America. Nevertheless, the work of the American society is well known in France and engineers are far from being in ignorance of the advantages obtained by standardization. It is rather peculiar that the first definite proposal in favor of the standardization of automobile steels should come from the Paris General Omnibus Co., which until the war was not an automobile manufacturing concern at all.

This company is of the opinion that for heavy vehicles at least the specifications of steels used in the automobile industry could be reduced to five or six. No decision was taken on this point, the matter being referred to the standardization section, which is handling the general problem of standardization of metals throughout the engineering industry.

Army Favors Standardization

Dealing with accessories, M. Lumet pointed out that the army is strongly in favor of standardization of such things as screw threads, gasoline pipes, caps for gasoline tanks and radiators, plugs in base chamber, gearboxes, differential housings, etc. Already magneto bases and couplings have been standardized throughout the French automobile and aviation services. The same has been done for drive chains, and a year ago standardization was decided on for solid tires and rims.

Other questions brought up in this report were maximum axle loads and technical education.

With regard to economic conditions, M. Lumet brought forward the conclusions arrived at by the French Chambre Syndicale of Automobile Manufacturers, a body under the presidency of Louis Renault uniting about 85 per cent of the automobile manufacturers of France. This organization is of the opinion that foreign automobiles now owned by the war department should not be thrown on the market at the end of the war, but should be retained by the military authorities until unfit for further service. They also propose that the pre-war import duties, based on weight but practically equivalent to 8 per cent of the value, should be abolished in favor of a 70 per cent ad valorem duty for the first twelve months after the war, 40 per cent for the second year, and 20 to 30 per cent from the twenty-fifth and following months after the war. These proposals have been submitted by the French automobile manufacturers to the Minister of Finance, but were not voted on by the Congress.

Marine Internal Combustion Engines

M. Lumet also presented a report on the development of the use of internal combustion engines in the merchant marine. In 1914, just before the outbreak of war, the Naval Department organized a naval exhibition at Boulogne, together with a competition for French engines for fishing boats, it being the intention to subsidize these boats in the same way as has been done for several years for automobile trucks.

The marine internal combustion engine has received very little attention in France. A law passed in 1906 offered a subsidy to motor boats and ships on condition that both hull and machinery were of French construction. France did not possess Diesel and similar engines and there was no encouragement to fit foreign engines, for if this were done the subsidy was lost for the entire ship.

The war showed this situation to be so disadvan-

tageous to French interests that in 1916 an exception was made whereby all vessels put under construction not later than eight months before the cessation of hostilities should be entitled to the subsidy on the hull even if the machinery were of foreign construction.

The Congress voted that this exception be allowed to remain in force for three years following the end of hostilities, thus encouraging ship owners to use foreign internal combustion engines while the French industry is preparing to meet the new demand.

The inequality resulting from the law which allowed coal to be brought into ports under the duty of only 24 cents a ton, while oil for Diesel engines was taxed \$18 a ton, was pointed out and a resolution passed in favor of the creation of heavy oil depots in all ports with duties no higher than those levied on coal.

In the aviation section Lieut.-Colonel G. Espitalier dealt with the possibilities of aviation after the war, with the conclusions that the Ministry of the Colonies should organize an aerial geographical and photographic section and that a regular aerial post should be established over all the colonial routes at present covered by caravans only.

It was also voted that the postal service undertake the organization of mail and parcel post over the important routes of France, as well as between France and Corsica, Algeria and England. Also that regular passenger services be organized as soon as the essential conditions of security have been obtained.

Aerial Police Regulations

The Congress being of the opinion that aerial services could not succeed unless there was some guarantee against competition, it was voted that aerial police regulations should be drawn up and that companies starting a public service should be given a limited concession, under a government technical and commercial control.

All present airplanes having been built for war conditions, and in consequence being unsuitable for commercial service, it was voted that manufacturers be asked to study big load capacity and high-powered airplanes suitable for after-war conditions.

Colonel Roche pointed out that no college course now exists for the formation of technical staffs in the airplane industry. He outlined the course of instruction most suitable for the formation of aviation engineers and concluded with a proposal, voted by the Congress, that both the State and manufacturers should encourage every serious organization created with the object of training aviation engineers.

R. Soreau presented a strong case in favor of the building of a low-pressure and low-temperature laboratory-tunnel in which to test airplane engines. It was claimed that although inferior in general construction, German airplanes had a higher ceiling than similar French planes on account of greater attention being paid to the suitability of the engine for operating at high altitudes. The Germans have two low-pressure and low-temperature laboratories, while the Allies have none.

Propose \$300,000 Air Tunnel

The proposed scheme is for the construction in France of a \$300,000 laboratory tunnel in which engines could be tested under exactly the same atmospheric conditions as are found at high altitudes. The proposed laboratory consists of a tunnel in armored concrete 492 ft. long; having two concentric chambers, the inner one with a diameter of 16.4 ft. and the outer with a diameter of 24.6 ft. The object of the outer cylinder is to

provide a return passage for the cold air of the central chamber, thus increasing the length of time during which this air could be cooled.

Such a laboratory would receive motors up to 500 hp. mounted in their own fuselage and driving their own propeller. The temperature could be reduced to 35 deg. C. and maintained at this low figure for 20 to 25 min.; the degree of dampness could be varied at will, and ice, hail, icicles, snow and brusque variations of temperature obtained, thus getting all the varied atmospheric conditions to be found at high altitudes. It was pointed out that for lack of such a laboratory it frequently happened that a full year elapsed between the successful passing of bench tests by a new engine and the complete tuning up of that engine on an airplane. So few scientific data were available regarding conditions at high altitudes that the tuning up on the plane was no better than tinkering.

The automobile industry and indeed the whole industrial organization of France is so bound up with touring that there was no hesitation in devoting one branch of the Civil Engineers' Congress to touring and hotel industries. The Government showed its interest in this by founding, in 1910, a National Touring Office, the object of which was to co-ordinate the work done by such private organizations as the Touring Club of France, the Automobile Club of France, the Alpine Club, etc., and to carry out propaganda work in foreign countries more influentially than could be done by any private organization.

In one of the two reports presented Messrs. Baudry de Saunier and Auscher pointed out that the mountains, rivers, roads, picturesque sites and fine architecture of France are a national asset which should be cultivated. In 1913 1,100,000 people visited Mont Blanc; supposing that each of these persons spent \$10, which is a very meagre estimate, the turnover for Mont Blanc was thus \$11,000,000, most of it being money brought into France from abroad. Mont Blanc and the other natural wonders of

France cost the country nothing. The Eiffel Tower, erected as an attraction, cost \$2,000,000.

It is recognized that if the natural beauties of France are to be exploited there must be good hotels. The fact is not disguised that at the present time France provides good food and excellent cooking everywhere, but is lacking in well-kept, medium-class hotels. Unless these hotels are built the natural beauties of the country will inevitably remain unexploited. In order to meet the shortage the National Touring Office, working in conjunction with the Tour Club of France, has brought about a union of all hotel interests and has succeeded in inducing a group of banks to advance capital to hotel proprietors or to approved persons about to establish hotels. In addition the Touring Club of France has established fourteen schools for the training of hotel proprietors and staffs.

Taking full account of the shortage of tonnage which will exist after the war, it is estimated that 3,000,000 tourists will visit France during the three years following the declaration of peace. The average length of stay will be thirty days, and the daily expenditure will be not less than \$20 per day, which means that \$1,800,000,000 will be brought into France within three years of the end of the war. If the industry is correctly handled, this amount will increase, for until the submarine campaign made inroads into shipping it was estimated that 1,500,000 persons would come into France during the first year of peace.

The Government has decided that the battlefields of France shall be thrown open to the visitor at the earliest possible moment, and toward this end the National Touring Office has worked in conjunction with the transportation companies to plan touring routes into the army zones and surrounding districts. In direct competition to the German Baedeker, the Michelin Tire Co. has started the publication of a very valuable and complete series of guides to the battlefields of France. The first volume of this work has already been published.

French Air Tunnel

Low-Temperature, Low-Pressure, for Testing Airplane Engines—
Germans Lead in Engine Ceiling at Present

By R. Foreau

THE commission of aviation engines, which has had the task of examining all captured enemy airplanes, has been struck by the fact that so far as construction only is concerned these planes and motors are inferior to those of French construction. Nevertheless these enemy airplanes have a ceiling generally as high as that of French machines. This contradiction can only be explained by a better adaptation of German motors to flights at high altitudes, or to the use of better quality gasoline. The opinion that the first cause is the predominating one is corroborated by the fact that our enemies have given close experimental study to the problem of motors operating at high altitudes.

The Germans have built big laboratory tunnels at Ludwigshafen and at Wiesbaden in the works of two important manufacturers of ice-making plants. This would indicate that the tunnels are designed to provide not only a low pressure but also low temperatures and probably the meteorological conditions met by airplanes at high altitudes. These stations are in constant use for technical research work, as well as for

engine tests before these engines are put into planes.

In France and among the Allies no such work has been undertaken. Our present laboratories are only fitted for aerodynamic experiments. The tests which have been carried out in the Alps, at the top of Lautaret, cannot be compared with the tests and research work possible in a permanent laboratory, with a very wide range of temperatures and pressures, with the reproduction of all varied meteorological conditions, damp air, ice, hail, snow, icicles, etc., which exercise such an important influence on the engine and its accessories.

The diminution of atmospheric pressure with the increase of altitude is only one of the elements of the problem; undoubtedly it is the one easiest to follow and offering the fewest surprises. The influence of low temperatures, of dampness, of abrupt variations by reason of rapid descents, is at least equally important, for it brings about important changes in the operation of the engine and may even cause its stoppage.

Thus the Commission of Aviation Motors is unanimous in recognizing the important interest and even

the necessity of obtaining a laboratory tunnel in order that France may maintain its leading position in the aeronautical industry. It is believed that this necessity is urgent, for it is obviously in the national interests that the experience thus obtained should be made use of, if possible, during the war.

At the first meeting of the Commission Ch. Lambert communicated the results obtained at the military refrigerating station at La Villette, these results showing the enormous value of a tunnel which combined low atmospheric pressure with low temperature. He outlined a general program of co-operative work to be undertaken by this laboratory with the object of determining practical coefficients to be used by all makers, who would thus be able to make verifications on their own machines. There is no doubt this would give important positive results. It can be calculated also that a considerable increase in power for a given weight would be obtained.

At the same time, P. Clerget brought forward some convincing arguments on the necessity of a tunnel and laid down the principal conditions to be fulfilled. With present data, stated M. Clerget, manufacturers have been able to produce types of engines giving satisfaction on the test bench; but between the date when these engines are in perfect condition on the bench and the date when they are perfectly tuned up on the airplane there is a long interval, sometimes of more than a year. During this interval very difficult experiments are carried out on the engine itself, on the carbureter, on the cooling apparatus and on the methods of supplying fuel. During this time there are no scientific data to work on. As conditions are becoming more and more strenuous and engines are constantly increasing in power, these empiric processes, if continued, will entail long delays and considerable expenses.

The greatest benefit which could be given to airplane engine manufacturers would be the construction of a laboratory in which engines could be tested under varied conditions approaching as closely as possible those met in flight. The engine, driving its own propeller, should be mounted in the fuselage with its gas and oil tanks and its own cooling system as used in flight.

The Commission of Aviation Motors decided to draw

up a report taking into consideration the observations of all its members and to send this to all manufacturers interested, in order to obtain their practical and financial support. This report was entrusted to Messrs. Lambert and Clerget.

The report contains two interesting novelties:

1. The tunnel is a double tube so designed that the annular portion is made use of for the return of the air having passed through the central portion, thus doubling the time during which cooling can be carried out.

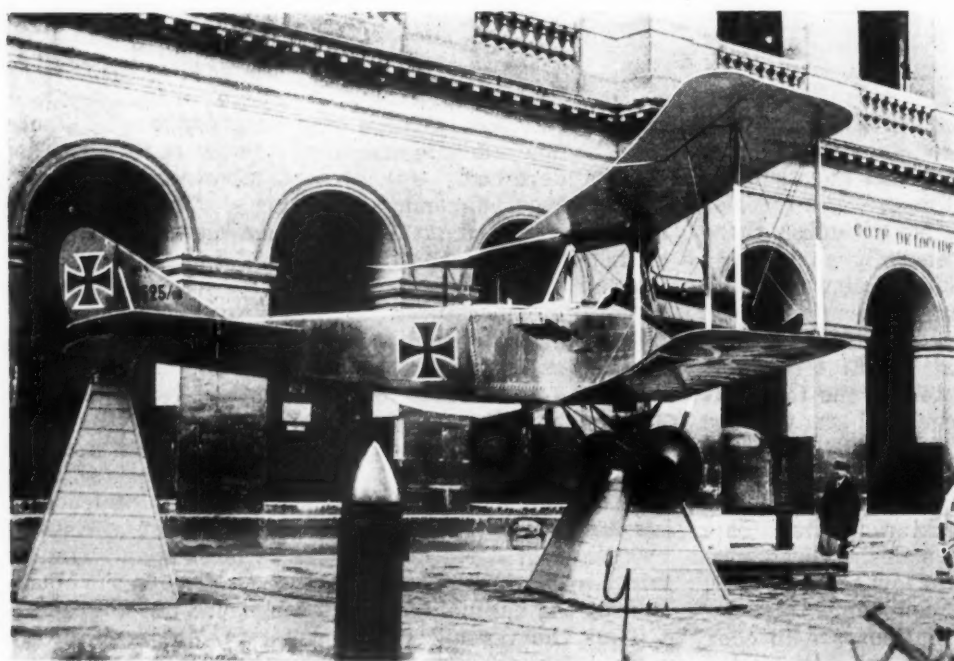
2. The refrigerating arrangements have been laid out so that the tests can be made in a current of air, the temperature of which can be reduced to -35°C . and maintained for 20 or 25 min.

The tunnel is in reinforced concrete. The inner chamber has a diameter of 16.4 ft. and the outer chamber 24.6 ft., the total length being 492 ft.

The central cylinder forms a huge, closed, air-tight chamber in which the engine can be fixed with its fuselage and propeller and made to operate in rarefied atmosphere at a very low temperature and at various hygrometric degrees. It can receive motors up to 500 horsepower.

The total outlay for the construction and operation of such a laboratory for a period of three years is in round figures \$300,000. The rôle of the commission is limited to the preparation of plans for the establishment of a laboratory, obtaining the support of the manufacturers, and then asking the Congress to appeal to the public authorities for its assistance in the execution of these plans, of which the army would be the first to benefit.

The vote taken on this matter was that the Congress transmit the project to the Chambre Syndicale of Aviation Manufacturers, requesting that the manufacturers take the initiative of forming a company for the carrying out of this program; also that the Ministry of Armament, the Under-Secretary of State for Aviation, and the Ministry of Finance facilitate the construction of this laboratory by helping to secure labor, material, tools, machinery, etc., and that aviation manufacturers be allowed to write down as general expenses—and thus not subject to taxation—all subscriptions given towards the \$300,000 laboratory.



War Trophies Exhibit

The photograph shows a captured German scout biplane mounted for exhibition at the Hotel des Invalides (Veterans' Home), Paris.

French Automobile Industry After War

ONE of the first questions to be solved is the desirability of reducing to a minimum the specifications of steels and other metals required in automobile construction.

This question is one of general interest, applying not only to the automobile industry but to mechanical industries as a whole. On this account it has been dealt with in a report by M. Ed. Sauvage on the unification and standardization of industrial constructions.

Each industry has its own special requirements, which should be clearly defined, with regard to the choice of metals. This definition is not the work of the present Congress, but merely as an example I should like to present a table which has been communicated to me by the Paris General Omnibus Co. and which gives a classifica-

- 1—Standardization of Steels
- 2—Fewer Solid Tire Sizes
- 3—Axle Loads to Be Revised
- 4—Technical Training Schools
- 5—New Import Tax Schedule
- 6—Will Retain War Cars

By G. Lumet

We are also of the opinion that it is desirable to establish well-defined specifications for cast steels, bronzes and aluminum. The standardization of these metals being much easier than that of special steels, a model set of specifications could easily be drawn up by automobile manufacturers. This matter is evidently one for serious discussion. Thus I suggest that the transportation sub-section of this congress approve the conclusion of the report of M. Sauvage, which is in favor of a permanent commission for the study of industrial unification.

tation sub-section of this congress approve the conclusion of the report of M. Sauvage, which is in favor of a permanent commission for the study of industrial unification.

Automobile Accessories

What are the automobile accessories which could be standardized to the general benefit of the automobile industry?

It is certain that while we may be in agreement on the general principles of standardization, if we push the principles to extremes we shall meet with opposition from the greater part of the manufacturers themselves, who are naturally anxious to introduce new and personal improvements in the goods they manufacture.

Uniformity with regard to standardization can most readily be obtained for such accessory parts as the threads of gasoline connections, water connections, caps for gasoline tanks and radiators, plugs in base chambers, motors, in gearboxes and in differential housings. The automobile service of the French army is decidedly interested in this question of standardization of accessories.

The interchangeability of certain parts is undoubtedly of value to all big users of automobiles. Some results have been obtained in sizes of rubber tires, chains, magnetos and spark plugs. Much remains to be done, however, and it is worth considering if we cannot establish well defined series for ball bearings, grease cups, springs, etc.

Solid Rubber Tires

Is it not possible to limit the number of sizes of solid rubber tires on commercial vehicles?

This question is being treated separately, for by reason of the war some steps have been taken towards a solution. The work done already is important, but it can be improved on, and the matter is of such importance that it is worthy of special attention.

As a proof of the importance of this question it is sufficient to quote the conclusions of the manufacturing section of the French army concerning the dimensions of rims and bases of solid tires. The standardization of these dimensions was necessary for tire makers, truck manufacturers and both military and civilian users of trucks. It was decided that from April 1, 1917, all wheels intended to receive solid rubber tires and all rubber tires should be supplied with rims and bases according to the table on page 762, the tolerances being $+1\frac{1}{2}$ mm. and -0 for the circumference of the rim, and $-1\frac{1}{2}$ mm. $+0$ for the circumference of the base.

The circumferences are measured with a ribbon having $3/10$ mm. thickness.

Nature and Characteristics of the Steels Employed

Nature of the Organ	Steel	Tensile Strength in Lb. per Sq. In.	Elongation (Per Cent)	Reduction of Area (Per Cent)	Heat Treatment (Fahr. Deg.)
Connecting rods and crankshafts.	Nickel and chrome steels, semi-hard.	128,000	13	18	Annealed in oil at 1650 deg. Re-heat to 930 deg.
Gear shafts without gears; differential drive shafts, axles.	Same quality as above.	149,000	12	14	Annealed in oil at 1650 deg. Re-heat to 810 deg.
Gear shafts with gears.	Same quality as above.	..	..	..	Annealed in oil at 1650 deg. Shaft only reheated to 810 deg.
Gears not in constant mesh.	Nickel and chrome steels, extra-hard.	270,000	3	8	Annealed in oil at 1650 deg. Re-heat to 660 deg.
Gears in constant mesh.	Mild case hardening steel, nickel or chrome.	142,000	12 Under the hardened surface.	25 Under the hardened surface.	Annealed in oil at 1560 deg.
Springs.....	Mangan - silicieux steel.	..	..	..	..
Valves.....	Steel with a high percentage of nickel.	..	..	..	..

tion of metals considered suitable for automobile construction. The Paris General Omnibus Co. has a monopoly of the motorbus service in Paris; before the war it assembled motorbuses; since the war it has built several thousands.

There is reason to be surprised at the great variety of special steels proposed by steelmakers, while the number of organs working under different mechanical conditions is relatively small. Thus it would appear to be of the greatest value to steelmakers, as well as to automobile manufacturers, to reduce to a minimum the specifications of special steels. This would simplify the task of the steelmakers as well as the choice of automobile manufacturers, for it is well known that among the multiplicity of steels the choice is not invariably satisfactory.

On this basis the Paris General Omnibus Co. believes that it is possible to reduce steel specifications to five or six, at any rate for truck construction.

On account of this thickness the measured circumferences are not exactly equal to the diameter multiplied by 3.1416.

Tolerance for circumferences as measured by the ribbon:

Rims $+1\frac{1}{2}$ mm.; -0
Bases $-1\frac{1}{2}$ mm.; $+0$

The above decisions were taken after very important investigations by Lieut.-Colonel Ferrus, director of the French technical automobile section. It is hoped the congress will mark its interest in this by submitting the conclusion to the permanent commission on standardization asked for by M. Sauvage.

First Conclusion.—I propose that the subsection gives its support, so far as the automobile industry is concerned, to the conclusion of the report by M. Sauvage on the unification of standards in commercial construction. These conclusions are as follows:

"The congress asks the society for the encouragement of national industry and the Society of Civil Engineers to come to an agreement, by an appeal to other important technical societies, if necessary, for the formation of a permanent commission to study the question of industrial standardization. This commission will take into consideration the work already done in this connection, and particularly the work of the Engineering Standards Committee. It will decide on the questions to be studied and their order of urgency, and will constitute for this work special sub-commissions, of which competent persons shall be invited to become members. In addition the commission will appeal to the government in favor of industrial standardization; it will request that Government officials give their assistance; by contributing toward the expenses of research work; it will request that its standards be adopted as far as possible in Government factories and in contracts for the Government. It will appeal to the various technical societies, to the manufacturing syndicates and to big manufacturing concerns, requesting their widest possible co-operation in the establishment and in the use of its standards."

Maximum Axle Loads for Trucks

The axle loads formerly imposed by the military authority in its commercial truck competitions and the regulations of the civilian authorities no longer meet industrial requirements. This question has been studied in detail at the various international road congresses. At the second Road Congress, held at Brussels, the French department of roads and bridges admitted the principle that the road was sufficiently protected against abnormal wear by the limitation of maximum speed and by the unit of load per centimeter of linear section of the tire in contact with the road surface. For public service vehicles and commercial transport this unit of load was fixed at 330 pounds per centimeter with the restriction that for public service passenger-carrying vehicles the speed limit should be 15.5 m.p.h. and that the weight on the axle should not exceed 4 tons. For commercial transportation the maximum speed should be 12.4 m.p.h. with an axle load limit of $4\frac{1}{2}$ tons, and 7.4 m.p.h. with an axle load limit of 7 tons. It was understood that the standard of 330 pounds per centimeter should be for wheels of 39 inches diameter, and that for wheels of a greater diameter the load should be calculated according to the formula

$$C = 150\sqrt{D}$$

In which D = the length of the diameter expressed in meters.

C = the load expressed in kilograms.

On this question the congress decides that it is neces-

sary to protect the road against abnormal wear, and to do this there should be imposed on heavy automobile trucks a maximum load per centimeter of the linear section of the tire in contact with the road surface. In order to fix on this standard, and in order to determine the influence of the diameter of the wheel on this standard, it is necessary to request the Government to continue careful experiments and researches of road wear in collaboration with the associated syndicates of automobile manufacturers.

Technical and Professional Education

The question of technical education is one of the greatest importance to the automobile industry. The training of workmen and shop foremen has received the attention of manufacturers, and in certain factories special shops have been opened for apprentices and theoretical instruction is given to young workmen.

The formation of a school for foremen and chiefs of departments in specialized branches of the automobile industry would be of great value to the industry if this school were fitted up with modern tools and with a laboratory for the testing of materials and engines. It

Dimensions of Rims and Bases for Solid Tires

RIMS		BASES		SECTIONS AND DIAMETERS OF CORRESPONDING TIRES									
External Diameter	External Circumference	Internal Diameter	Internal Circumference	85	90	100	110	120	130	140	160	180	
Mm.	Mm.	Mm.	Mm.										
701	2203	699.6	2197			850		860					
721	2266	719.7	2260	850	860	970		900		900	900		
741	2328.5	739.6	2322.5					905					
751	2360	749.6	2354			900	900	910		930	930		
756	2376	754.7	2370		900	910		920					
771	2423	769.6	2417		920	920	920	930	940	950	950	940	
											(970)	(970)	
804	2526.5	802.6	2520.5		945	950							
					(950)								
816	2564	814.5	2558	950	950								
851	2674	849.5	2667.5			1000	1000	1010	1000	1000	1000	1000	1000
											1030	1030	1030
881	2768.5	879.5	2762		1020	1030							
901	2831.5	899.4	2824.5			1050	1055	1060					
1000.5	3144	998.8	3137			1140	1140	1160	1160	1160	1160	1160	1160

is the task of the syndicate of automobile manufacturers and other similar organizations desirous of developing this industry to form such schools. The congress is not concerned with indicating a program of study, but it goes on record as favorable to this scheme and affirms its interest in the work of that portion of the congress concerned with technical education as applied to the special work of the automobile industry.

Economic Questions

The economic questions which are of the greatest interest to the future of our industry are:

1—The establishment of new customs duties immediately war is over.

2—Measures to be taken to prevent the ruin of the automobile market by the vehicles of all kinds at present in service with the armies.

The war has been responsible for completely removing the automobile factories from their normal activities; the greater part of the factories have been more or less completely given up to the making of munitions so that stocks of raw material and finished parts carried by the factory were practically non-existent from 1916. It will therefore be very difficult for our manufacturers to compete with rivals who are ready for important business during the few months following the cessation of fighting.

The Government ought to take action in this connec-

tion. We are not primarily partisans of State intervention in any French industry, and particularly in the automobile industry which has been built up and developed to a very high degree without any assistance whatever from the State.

Nevertheless, automobile manufacturers will have a difficult task to put their factories into the condition they were in 1913. Many of the workers have been dispersed. There will be an inevitable period of slackness on getting back to normal business. It is to be feared that foreign manufacturers will take advantage of this situation in order to seize the markets before we can get in touch with our clients.

In order to remedy this state of affairs, it is certain that our tariffs must be revised. We are all of the opinion that our present tariffs do not correspond to the needs of modern construction. Many competent persons are of the opinion that it would be of value to our country to completely modify the basis of our import duties by the adoption of a tax based on ad valorem value in place of the specific tax at present in force. The *Chambre Syndicale of Automobile Manufacturers* has presented to the Ministry of Commerce a scale of import duties, the highest of which would be applied immediately after the war and which would be modified as the French industry recuperated. Three periods are considered:

Scale of Import Duties

1. For the first twelve months an import duty of 70 per cent of the value on automobiles, chassis with or without motors, bodies finished or unfinished, motorcycles with two or three wheels.
2. From the thirteenth to the twenty-fourth months, inclusive, an import duty of 40 per cent on automobiles, chassis with or without motors, bodies finished or unfinished, motorcycles with two or three wheels.
3. From the twenty-fifth month an import duty of 30 per cent general tariff, 25 per cent minimum tariff on passenger carrying automobiles, chassis with or without motors, bodies finished or unfinished; a general tariff of 25 per cent and a minimum tariff of 20 per cent for auto-

mobile trucks, and 30 and 25 per cent for motorcycles. Tires would be taxed separately, as at present.

It is understood that spare parts would be taxed on the same scale, which is not the case at present. These conclusions have been carefully considered by the *Chambre Syndicale of Automobile Manufacturers* and have been submitted to the Minister of Commerce; thus it is considered that they should be approved by the Congress of Civil Engineers, and the following conclusions are put forward:

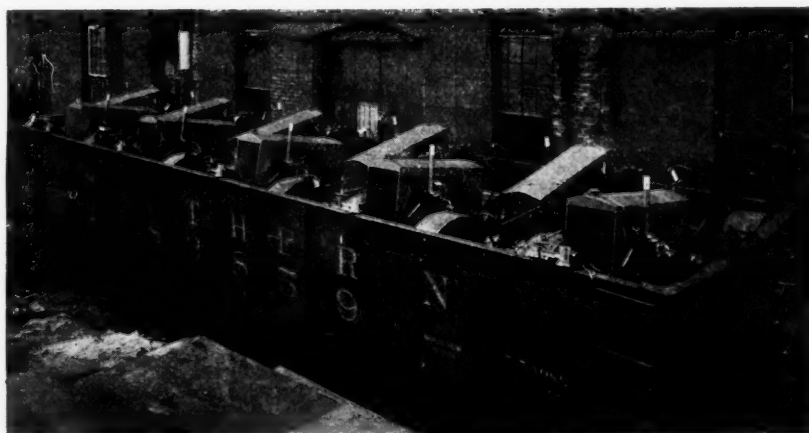
War Cars and Post-War Industry

The sub-section of the congress should impress on the public authorities the value of the proposals put forward by the *Chambre Syndicale of Automobile Manufacturers* with regard to the raising of import duties immediately on the cessation of hostilities. The return of quantities of army automobiles to civilian service is particularly grave for the French automobile industry. This industry is afraid that the sudden appearance on the market of quantities of war automobiles would cause an abrupt cessation of manufacturing and would throw workers on the streets. The congress cannot interfere in this matter or suggest a solution. The sale of war-worn cars has already begun and the congress can only hope that an agreement exists between the automobile manufacturers and the war authorities. Nevertheless, it appears to me that the congress could support a proposition made by the *Chambre Syndicale of Automobile Manufacturers* concerning foreign automobiles, and I therefore propose the following conclusion:

"The sub-section of the congress votes the opinion that the military authorities should study the means of retaining in its possession all the foreign automobiles it has been necessary to purchase during the war, owing to the inability of French manufacturers to deliver immediately because of a lack of necessary measures taken during peace time. It would be profoundly unjust to allow the sale of these automobiles after the war, thus causing serious competition with our national industry."

Shipping Tractors

The accompanying photographs show how Wallis tractors are loaded in railroad cars for shipment, at the plant of the Case Plow Co., Racine, Wis. Open cars are used, and ten tractors are loaded on one car



Opposition to Liberty Engine Due to Interests in Other Types

America Has Eighteen Air Squadrons on Our French Front—264 Liberty Engines Now in Service—Delays in Design Due to Orders from France—Bill to Create Air Administrator Is Framed

WASHINGTON, April 16—The airplane situation as created by the numerous recent investigations and reports and those to be made is still in an uncertain condition. The majority and minority reports of the Senate Military Affairs Committee created some discussion, but have not been taken with great seriousness. Considerable interest is displayed in the report of the Committee headed by H. Snowden Marshall which was delivered personally to President Wilson last Saturday and which has not yet been made public.

Despite rumors and reports, it can be definitely stated here that there is not yet a certainty that the report will be made public. Most of the newspaper dispatches regarding the Marshall report were due to the loquacity of members of the Marshall Committee, but they are not authentic and do not represent the report as it was finally handed to the President.

Senate Majority Report Claimed Unfair

The majority report of the Senate Committee has been denounced as unfair in many quarters. One of the chief accusations of the report was that this country failed to make use of available foreign engines. It is known that many of those who testified before the Senate Committee were parties personally interested in foreign engines.

The Committee was also told by the aircraft authorities of early attempts to really employ the foreign engines. It is told that at the beginning of the war this country planned to spend \$20,000,000 for a special factory for the manufacture of the 225 hp. Rolls-Royce engines.

These engines, the British authorities stated, would be produced to the number of 2000 within the first year. The plan was not at that time to build the 360 hp. Rolls-Royce because at that time it was not perfected in England. The aircraft officials here regarded the promise of 2000 Rolls-Royce engines in a year as practically nothing, since it would not commence to provide us with the requisite amount of airplanes.

At the same time they planned to go ahead with the program so as to be certain of some machines. Just then the remarkable reports of the Liberty engine tests were announced and the officials felt they were justified in pinning their hopes to the Liberty engine.

The Hispano-Suiza engine was also suggested, but Gen. Pershing's one demand was for fighting planes

and the Aircraft Board voted against it, feeling that the 150 horsepower of this engine did not justify concentration upon it. Members of the Aircraft Board, the Signal Corps and the Navy Aeronautical Division now point to the recent successes of the Liberty engine and the rapidly approaching point of quantity production and make the claim that their earlier activities were justified. They also point to the fact that the Senate Military Committee knew of the honest efforts of the officials to use foreign engines and of the reasons which prevented their use, and feel that the majority report was written despite this knowledge and was considerably influenced by the interested parties, politics and other motives.

Production of the Liberty engine is stated to be increasing steadily. Hampton Roads, one of the naval stations, is literally filled with planes equipped with Liberty engines, all displaying power and stability.

Congressman Gould of New York offered a bill following the report of the committee to provide for an Aircraft Administrator and for other purposes. It calls for an appropriation of \$25,000,000 with a salary of \$7,500 for the administrator; \$5,000 for a vice-administrator, both to be named by the President, and four assistant administrators, at \$4,500. The bill would abolish the present Aircraft Production Board, and would transfer all aircraft activities from the Signal Corps and Navy Department to the new office of Aircraft Administrator. The bill follows:

Bill Creating Aircraft Administrator

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there is hereby created the office of Aircraft Administrator, to be in charge of an Aircraft Administrator, who shall be appointed by the President, by and with the advice and consent of the Senate, and who shall receive a salary at the rate of \$7,500 per annum.

There shall be in such office a Vice-Aircraft Administrator, who shall be appointed by the President, by and with the advice and consent of the Senate, and who shall receive a salary at the rate of \$5,000 per annum, to have charge of the approval of all contracts and of all funds under such rules as the Aircraft Administrator may prescribe.

There shall be in such office four assistant administrators, each of whom shall be appointed by the President, by and with the advice and consent of the Senate, and shall receive a salary at the rate

of \$4,500 per annum. One of the assistant administrators shall have charge of a research and experimentation division as directed by the administrator. One assistant administrator shall have charge of an engineering and design division to supervise engines and planes and approve of accessories such as ordnance, radio apparatus, cameras, instruments, and so forth, which may be needed. One assistant administrator shall have charge of a production division and the requisitioning of all material, including accessories required for the product, and of a purchasing section under his jurisdiction which shall co-operate with the War Industries Board. One assistant administrator shall have charge of a distribution division which will include a traffic department to direct the movement of all purchased goods or completed product.

The Aircraft Administrator shall have full authority to lease, purchase, or construct all necessary office space or office equipment for the conduct of the business of this office. There shall also be in such office such experts, attorneys, clerks, and other employees as may be necessary and as may be from time to time provided for by Congress.

SEC. 2. That it shall be the province and duty of the Aircraft Administrator to encourage aircraft production and to develop the science of flying, and he shall be vested with full control over the governmental activities dealing with aeronautics.

There are hereby transferred to the office of the Aircraft Administrator the aeronautic section of the Signal Corps of the War Department and the office of Naval Aeronautics of the Navy Department, together with all that pertains thereto, and the President shall, from time to time, as he thinks best, transfer to the office of Aircraft Administrator the whole or any part of any bureau, division, or other branch of the Government engaged in work pertaining to aeronautics, and shall assign to such office any military or naval officers or enlisted men that he may deem necessary. All unexpended balances of appropriations available for the use of any transferred bureau, division, or other branch of the Government, or which may become available thereafter, shall be available for the office of Aircraft Administrator.

SEC. 3. That there is hereby appropriated, out of any money in the Treasury not otherwise appropriated, the sum of \$25,000,000 to be available immediately for the office of Aircraft Administrator for the purpose of carrying out the provisions of this act.

The Aircraft Production Board is hereby abolished, and the unexpended appropriation, if any, available for such board is hereby made available for the office of Aircraft Administrator.

It will be noted that the bill calls for an Aircraft Administrator who is to be "vested with full control over the governmental activities dealing with aeronautics." This would mean that Gen. Pershing, who is at the front and knows our airplane requirements, and whose word is now heeded completely, would find a confliction of authority on this side in an administrator who could accept or refuse the suggestions coming from the front. The bill also provides that "there are hereby transferred to the office of the Aircraft Administrator, the Aeronautic Section of the Signal Corps of the War Department, and the office of Naval Aeronautics of the Navy De-

partment." The Congressman who drew up this bill apparently intended by these transfers to withdraw jurisdiction of engineering, procurement, purchases and maintenance from the army and navy, but does not know that the office of the Naval Aeronautics has nothing to do with placing of contracts or procurement or maintenance of aircraft and is more of an advisory and supervising division. It is rumored that Senator Chamberlain, chairman of the Senate Military Affairs Committee, also intends to present a bill more inclusive and complete and along the same lines as Congressman Gould.

Indications are that Edward Stettinius, Assistant Secretary of War, will head the new Aircraft Board if one is created.

Howard E. Coffin, it is stated, is slated for a position of greater power under the new scheme. The rumors of his resignation can be definitely and positively stated to be untrue. Mr. Coffin has been in close touch and harmony with the Marshall committee, Secretary of War, Mr. Stettinius, and the President.

The appointment of Major-General Goethals to head a joint department of purchases, storage and traffic, directly under the general staff, and the discontinuance of the office of Surveyor General of supplies, which was held by Mr. Stettinius, are said to forecast the appointment of Mr. Stettinius as chief of aircraft activities. The minority report of the Senate Military Affairs Committee while directly opposed to the majority, of course, and considered more accurate here, is regarded as being too roseate. It is thought to be too much like the early over-optimistic reports.

One thing can be definitely stated about the Marshall report, and that is that it will deal specifically with every phase of aircraft production, with exhaustive comment wherever possible. In this it will differ considerably from the Senate majority report, which dealt chiefly in generalities.

Some interesting information was developed by Congressman Caldwell in a speech before the House of Representatives late last week, when he stated that there are 1220 American training planes and 185 combat planes in the American forces in France, of which five are equipped with Liberty engines. He stated further:

"We are about 90 days behind in our manufacturing schedule, and some of this has been made up from foreign purchases. Most of it was caused by two sources:

"First, when we laid out our program, the Allies, knowing what our equipment was, suggested that we devote our energy to the manufacture of training planes and the preparation of our men to fly them, with the understanding that as fast as they were sent abroad the Allies would supply them with combat machines and training on the front. We have kept our share of the program in that we have manufactured more training planes than we could use here, building up a reserve supply, and have manufactured all of the advanced training planes that we have had use for. The Signal Corps has sent 26,000 men abroad, of whom 7000 are mechanics, and we have shipped 11,000 tons of material to France.

"Second, our delay was caused by change of plans under orders from France. Three squadrons of eighteen planes each are now actually operating under the American flag and under American control over the four-mile sector held by the American army, and there are a great number of our men flying with England, France and Italy under foreign control, in preparation for joining American units after they have had experience with the Allies' veterans. And I am authorized to state that we have not a single flying officer that is ready to go to the front, that is, without a combat plane and its equipment.

"We have already constructed, tested, and put into service 264 Liberty engines, concerning which there has been so much criticism; eighteen of them are being used by the army, and a larger number by the navy. Forty engines have been sent to our allies; quantity production has started, and they will be delivered in increasing numbers. That the motors are a success is proved by the fact that our allies

have asked us to send them as many engines as we can spare.

"There is no question but that the Liberty engine will fly the combat plane recommended by General Pershing faster than any other engine now available, and I feel sure that when the war is over the Liberty engine will stand out as one of the great accomplishments of the war. The delay in turning out quantity production is amply justified in the efficiency of the machine developed. I am sorry to say that a great portion of the criticism of the Liberty engine has come from men interested in other types of engines which they hope to have adopted by the Government, notwithstanding the fact that they were not so powerful as the engine we had developed; and certain men, for partisan and personal reasons, have repeated these criticisms, thus giving them credence."

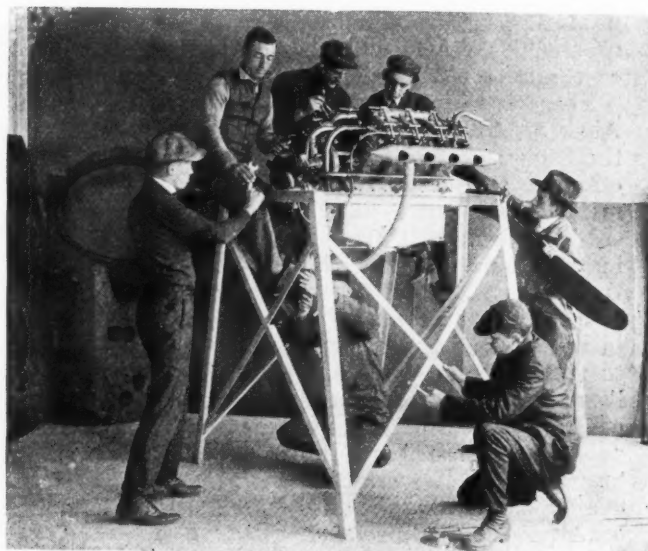
The speech made by Congressman Caldwell followed the issuance of the Senate Committee report.

Automobile School Trains Aircraft Mechanics

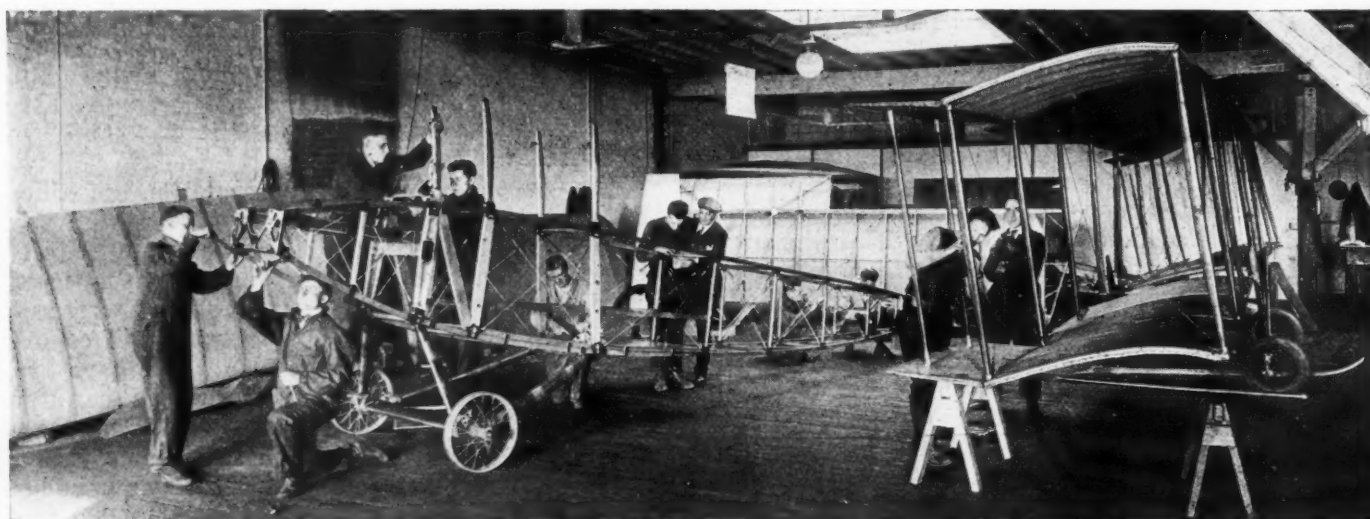
THE Michigan State Auto School has opened up an airplane mechanics' course in order to train men as aviation mechanics, or as production men for the airplane engine factories.

The course occupies 2 months and includes assembly, repair and operation of airplane engines, as well as construction and maintenance of the machine. The apparatus used for the work so far is confined to productions of the Curtiss plant, including a Curtiss Model J. N. 4. Students are given practical work, such as overhauling and rebuilding machines which have been in service. One of the machines which has been repaired had been badly damaged by a nose dive, and this gave the students ample practice. The engine of this plane, a Roberts six-cylinder, has also been rebuilt.

The airplane instruction is under the direction of a Curtiss expert who is at the head of this branch of the faculty. The aim of the school is to establish itself in this field not only for the time of the war but for the future, which is expected to bring important commercial developments in the aeronautical field. The accompanying illustrations show the work the students are doing at the school.



Putting the finishing touches on the engine



Students built this Curtiss J. N. 4 fuselage piece by piece

New Case 9-18 Tractor of Simpler Design

One-Piece Main Frame, Including Rear Axle, Transmission and Crankshaft Housing, Maintains Bearing Alignment and Reduces Weight—
Shorter Wheelbase Gives Reduced Turning Radius

DURING the last 2 years the J. I. Case T. M. Co., Racine, Wis., has been quietly developing a new kerosene burning 2-plow tractor. This tractor, on which quantity production is now under way and on which delivery was begun last week, is not an addition to the Case line, but will replace the already well established type A 9-18. The new machine will be known as the Case type B 9-18 and will sell

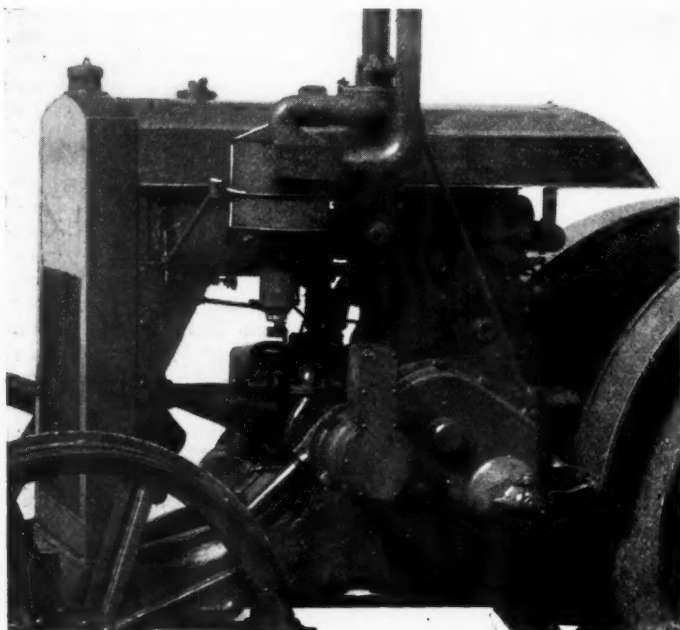
for \$1,225, the same as the old machine, but it shows a distinct advance in design and construction over the type A. The new model has undergone actual field tests under all sorts of soil conditions and in all climates for the last 2 years.

Some of the new features which mark advance in tractor construction are the Sylphon thermostat, the improved air washer, the new frame construction, giving a shorter wheel base and greater rigidity, and the reduced weight with increased drawbar pull.

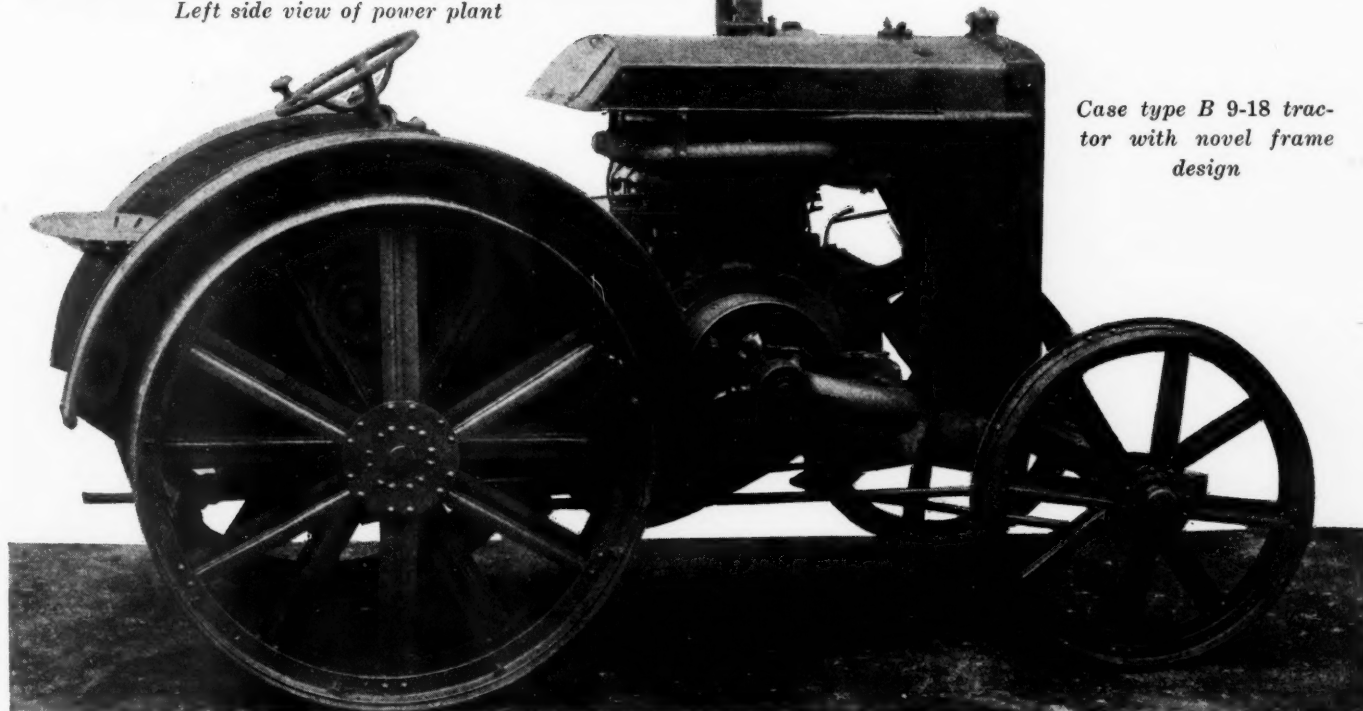
A new feature, and one possessed by no other tractor on the market, is the Sylphon thermostat, which controls the circulation of the cooling system. The manner of installation is shown in the illustration of the engine and radiator. Through the automatic operation of the Sylphon thermostat the engine cylinder is kept hot, thereby improving combustion and preventing raw kerosene from passing the pistons and diluting the oil in the crankcase. The illustration shows the internal construction and manner of operation of the thermostat. The radiator illustrated is not the type which will be used regularly. The standard radiator has a new reservoir, with cast top, bottom and sides, and can be disassembled easily and readily at any time by taking out a few bolts.

Improved Type of Air Washer

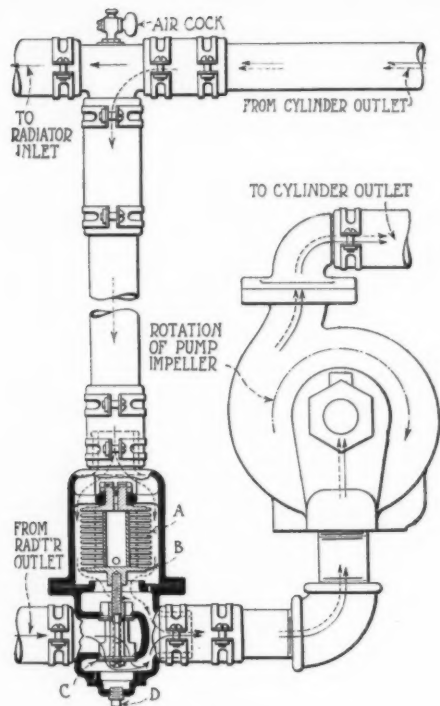
On the opposite, or right, side of the tractor is installed an improved type of air washer which is of the company's own design. This is of the water chamber and float type, but differs from other similar washers by the interposition of screens through which the air must pass on its way to the manifold. The screen used is of 32 mesh, and the location is shown in the illustration. It is claimed



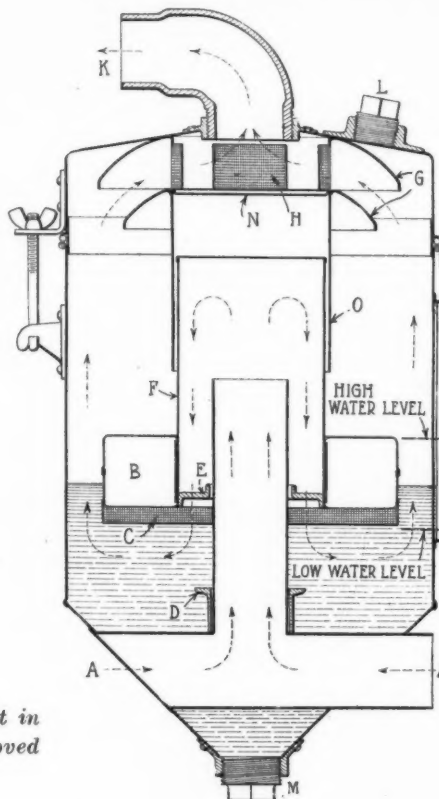
Left side view of power plant



Case type B 9-18 tractor with novel frame design



Above—Assembly of Sylphon thermostat in cooling circuit. On right—Case improved air washer



that by passing the air through a screen just before it enters the water it is so broken up that it cannot pass in large bubbles nor carry any quantity of dirt with it. After passing the water the air must penetrate another screen before it enters the manifold. This is to insure perfectly clean and pure air and thus prevent scoring of the cylinders and wearing of the piston rings. The washer also is equipped with a glass water gage, showing high and low marks for water, so that the operator always can tell at a glance whether his washer is working effectively.

The wheelbase of the type B has been so shortened that the turning radius has been reduced from 14½ to 11 ft. The construction of the main frame has been simplified and the engine is so mounted that factory production is accelerated and facilitated. In simplifying the frame construction a heavily ribbed design has been adopted which provides for great strength and rigidity and which reduces vibration. A dust-proof housing for the rear axle, a dust-proof container for the bull pinion shaft and the transmission case and crankcase are all cast integral with the main frame to insure perfect lubrication at all times.

The wheels, both drive and front, are a concession to farmer preference. It has been found difficult at times in the past to convince the farmer of the real strength of the suspended type of wheel. He much preferred to have something which had the obvious appearance of strength and rigidity. To meet this preference the Case people adopted the wheel which appears on the type B. To give both the appearance and the actuality of strength the drive wheels have angle iron felloes riveted to the 9-in. tires. Ribbed flat steel spokes are double riveted to the felloe at one end and at the other are riveted four times to the hub flange. The front wheels are of similar construction.

Weight Reduced

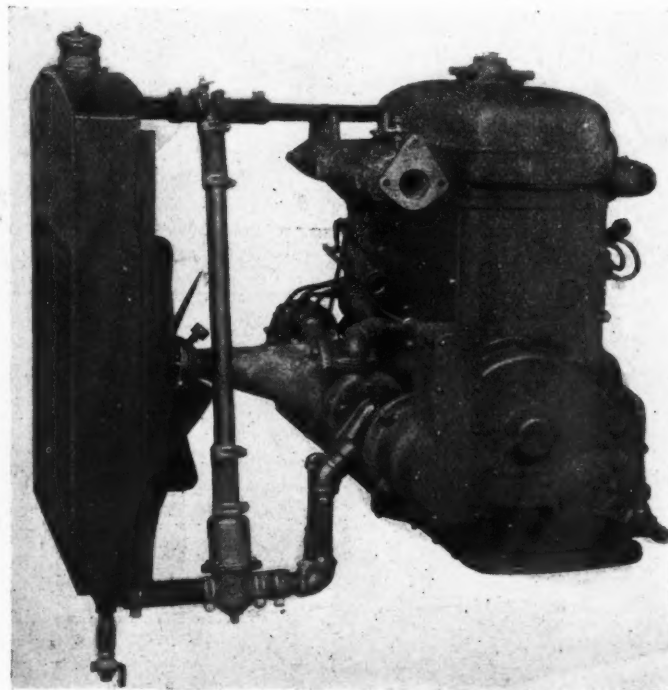
The weight of the type B tractor has been reduced from 3750 lb. to 3310 lb. and is distributed 68 per cent on the drive wheels and 32 per cent on the front wheels. The engine speed has been increased to a normal of 1050 r.p.m. The new machine is conservatively rated at 9 hp. drawbar and 18 hp. belt, the same as was type A. However, the type B will develop 12 hp. on the drawbar, thus providing a reserve power of 33 1/3 per cent for emergency pulls. This reserve enables the type B to pull two 14-in. bottoms set to any desired

depth and through any kind of soil and up any degree of grade where a team can pull a single 14-in. bottom. It is figured that with so large a margin of reserve power the tractor is not likely to be overloaded often.

The new model is equipped with a Case four-cylinder, vertical, block engine, 3½ by 5-in., placed transversely on the main frame. The engine has a removable head and valves in the head, the latter being 1½ in. in diameter. Fuel is fed by gravity to a Kingston 1½-in. carburetor and passes through a heated manifold to the cylinders. The engine runs at a normal speed of 1050 r.p.m., the speed being controlled by a flyball governor. The belt pulley has a diameter of 14¼ in. and face of 5½ in., and is fitted with a clutch and a brake. Ignition is by a dust-proof Kingston high-tension magneto with impulse starting coupling. The cooling system, which has a capacity of 9 gal., comprises a truck-type radiator with fan and a centrifugal pump, as well as the Sylphon thermostat. Lubrication is by the circulating splash system.

Two forward speeds and one reverse are afforded by the transmission, which has steel gears with machine-cut hardened teeth, the gears being fully enclosed and running in oil. The plowing speed is 2½ m.p.h. and the road speed 3½. Final drive is through a drop-forged and hardened spur pinion meshing with a steel master gear with 2 15/16-in. face, with its teeth cut and hardened. The gear is mounted on a drop-forged bull ring, securely fastened to a spider carrying the four steel differential pinions.

Hyatt roller bearings are fitted on the rear axle, the transmission shafts and the ball pinion shaft. There are removable bushings in the dust-proof hubs of the front wheels, and these are provided with grease cups. Driving wheels are 42-in. in diameter with 9-in. face, and 6 in. extension rims can be furnished on special order at an extra price. The front wheels are 30 in. in diameter and have a 6-in. face.



View of engine with its cooling system

Headlight Illumination Requirements

Tests Made Under Auspices of Illuminating Engineering Society and S. A. E.
to Determine Minimum Illumination Required and Maximum Glare
Tolerable—Personal Equation an Important Factor

IN view of plans for further headlight legislation in New York State and the general lack of definite data as to the necessary intensity of illumination required to make night driving safe, and the permissible glare from the headlights of approaching vehicles, the Lighting Division of the S. A. E. Standards Committee and the Illuminating Engineering Society, New York Branch, carried out a series of tests on the evening of March 5 which led to some interesting results. The direct object of the tests was to determine the minimum intensity of illumination necessary to reveal to an automobile driver at night the presence on the road of a person in dark clothing at distances of 150 ft. and 250 ft. respectively, and the maximum tolerable glare from the headlamps of an approaching vehicle at 100 ft. The reason for selecting this distance of 100 ft. may be explained with the aid of the diagram showing the fields of light of the two pairs of headlamps. It may be seen from this that at 100 ft. the driver is still well within the field of light of the approaching lamps, but as the cars come closer together he moves out of this field. At a greater distance the glare, of course, is less owing to the reduction in the intensity of illumination with distance from the source. Hence it seems reasonable to assume that the glare is most irritating at about 100 ft.

Set Up for Tests

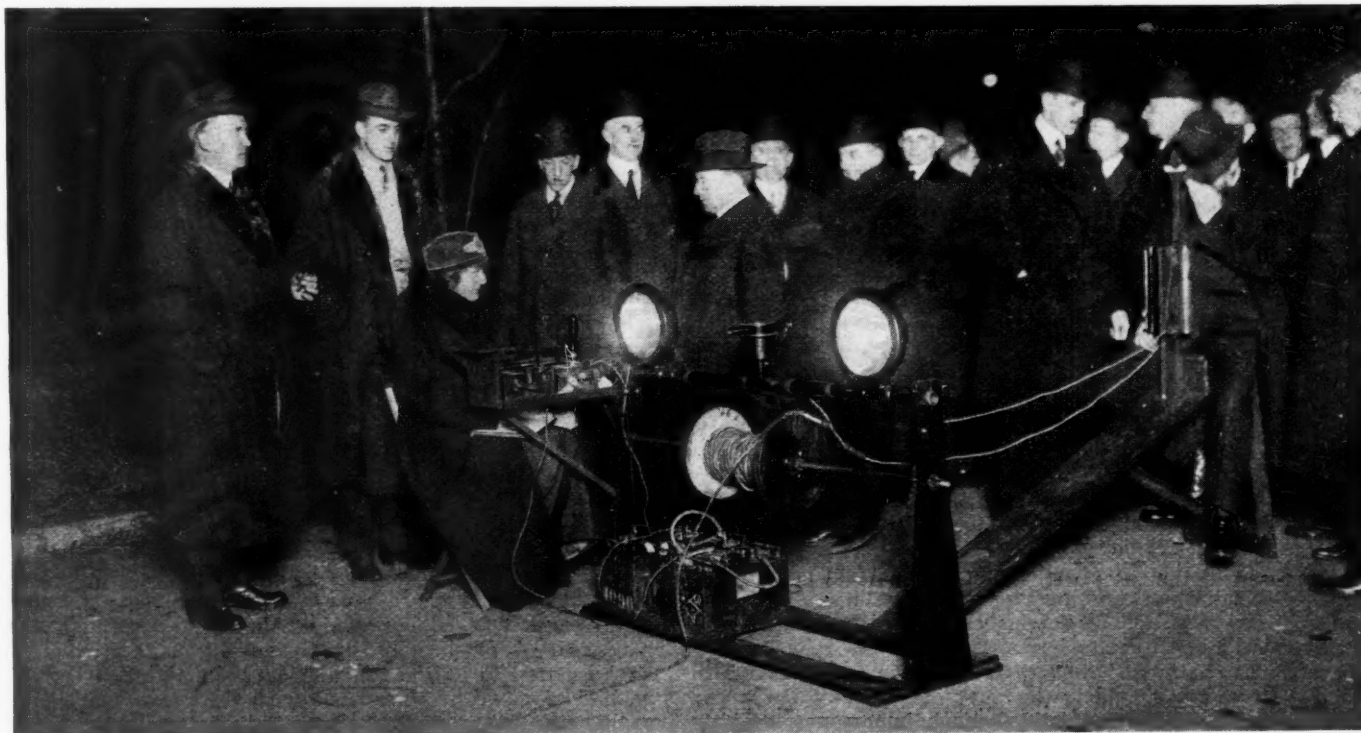
The tests referred to were held on a piece of road between Pelham Parkway and the Morris Park station of the New York, Westchester & Boston Railroad. Two pairs of parabolic headlamps were used, mounted on stands, and were supplied with current from a storage battery. In series with each pair of headlamps were an adjustable rheostat and an

ammeter. Before the tests were begun, the field of light in which the men were to be observed was mapped at both 150 and 250 ft. from the lamps, illumination measurements being made over the entire field by means of a Sharp-Millar photometer, while the current applied to the lamps was held at a given value. Illumination measurements at a given point were also made with other values of the current, so that the ratio of illumination change to current change was determined.

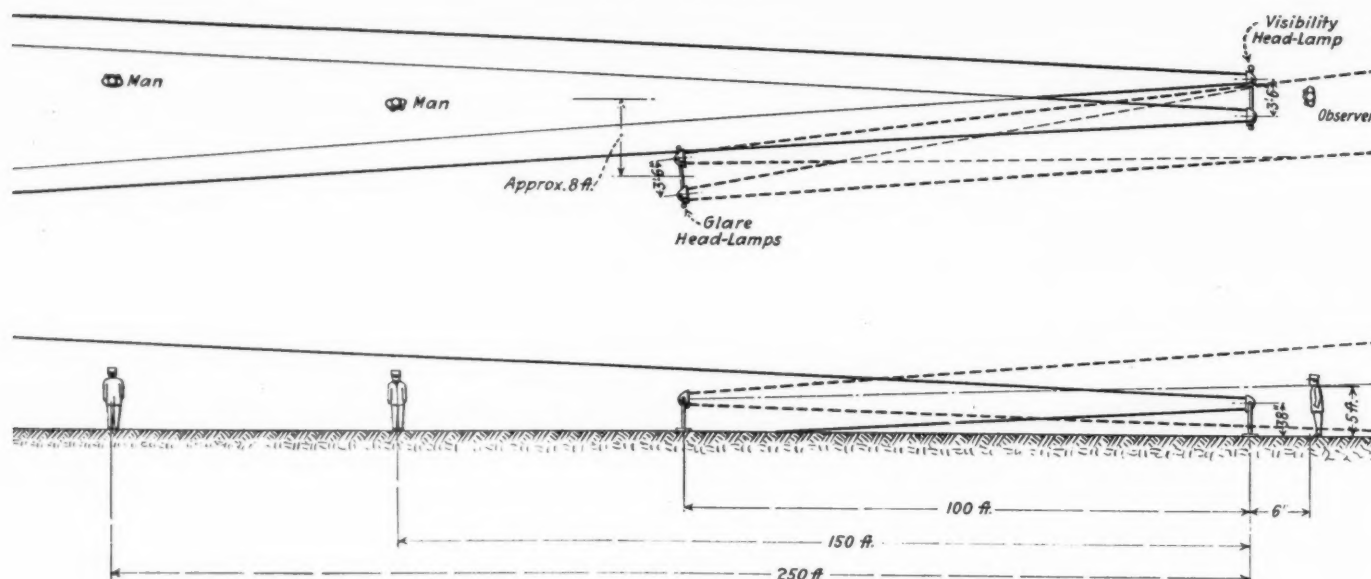
The flux density produced by the glaring lights in the observer's eyes was measured by placing a photometer on a chin rest used by the observers, and measuring the illumination at eye level. This was done with different values of current. Subsequently during the test only ammeter readings had to be taken, as the intensity of illumination at any particular point for any given current was known from the preliminary test. A few photometer readings for checking purposes were, however, also taken.

Forty-nine observers took part in the test, and a statement was obtained from each as to the amount of his experience in night driving. The results are compiled in a table. Each observer sat at the rheostat and adjusted the amount of light himself to a point where he considered that he could see the person in dark clothing in the road sufficiently distinctly for safety in driving, and he also adjusted the intensity of illumination from the pair of lamps intended to represent the headlamps of an approaching vehicle, until the glare was what he considered to be the maximum permissible.

As might be expected, the results arrived at by the different observers varied widely. The candlepower which different observers considered necessary to see a person in dark



Apparatus used for controlling and measuring illumination



Fields of light from the driver's own headlamps and those of an approaching car at 100 ft.

clothing at a distance of 150 ft. ahead of the car with sufficient distinctness for safety varied from 1000 to 10,000, the average of all observations being 3200. Similarly the candlepower considered necessary to show a person at a distance of 250 ft. ranged from 1300 to 18,300, the average being 6980.

In the glare test the headlamps intended to represent those of an approaching vehicle were arranged at a distance of 100 ft. from the observer, and the latter adjusted his own headlamps to such intensity that he could just see a person in dark clothing in the road at a distance of 250 ft. He then adjusted the other pair of headlamps until their glare was about all he could stand. The candlepower of the approaching headlamps arrived at under these conditions by the different observers varied from 80 to 850, the average value being 239.

The results were also worked out in foot candles—that is, in terms of intensity of illumination at a distance of 1 ft. from a source of illumination equal to 1 candlepower. The average intensity of illumination required to see a man at 150 ft. was 0.142 foot-candle, and at 250 ft. 0.112 foot-candle. The average glare which the observers could stand from a pair of approaching headlights at a distance of 100 ft. corresponded to an intensity of illumination of 0.024 foot-candles.

Results Discussed at Meeting

A joint meeting of the Illuminating Engineering Society and the S. A. E. Metropolitan Branch was held at the Electrical Testing Laboratories on the evening of April 11, at which the tests were reported. Dr. Sharp, who made the report, dwelt on the wide variations in the results obtained by different observers. He said that it was in part due to differences in eye sensitiveness in different individuals, but more largely to psychological factors. One of the conclusions to be drawn from the experimental results, he said, was that 1000 candlepower was the least luminous power to make a man visible at 150 ft., and a good deal more light was desirable. He said that preliminary tests made on a previous occasion had established the fact that the glare factor depended almost entirely on the intensity of illumination—that is, the foot-candles. He further pointed out that the lamps used in the tests were mounted on rigid stands, and the test conditions were therefore not absolutely equivalent to conditions met with in driving on the road, as there were no flashes of light due to irregularities in the road surface. The results obtained, however, would serve as a guide both in legislative action and in the work of headlamp designers. The committee did not want too much importance attached to the results, but believed that they would serve as a starting point.

It was shown by means of diagrams thrown on a screen

that if the different observations were given different weights depending upon the amounts of night driving experience of the observers, the results could be brought into much closer harmony than if all observations were given equal weight. These diagrams are reproduced herewith.

Mr. Stickney explained that the tests were decided upon as a result of a move on the part of the New York State legislature to enact a better headlight law. As a matter of fact, the New York Senate had requested two committees of the Illuminating Engineering Society, the Committee on Legislation and the Committee on Headlamp Illumination, for technical information. There had been hearings at Albany on the subject which extended over 2 days and were attended by the chairmen of the committees referred to and other members of the society. It had been the view of the society that the proper thing to do was to obtain numerical values for the minimum intensity of illumination and the maximum glare permissible, but the results of the tests, which covered a range with limiting values of 10:1, showed the futility of this plan.

The delegates to the hearing endeavored to convince the legislators that definite minimum and maximum figures for intensity of illumination should be given in the law, but the legislators did not know what a foot-candle was, and refused to listen to the plea. The next best thing was to put the whole matter in the hands of a competent official, the Secretary of State, and have him consult experts on the requirements. The latest plan was to have the Secretary of State draw up the headlight regulations, including methods for determining whether or not an automobile driver was complying with the regulations. The society, the speaker said, was very hopeful that something useful would be accomplished, as so many people were earnestly working on the problem. In a way the effort came under the heading of war service, for the reason that the railroads are greatly overcrowded and road traffic is increasing all the time. It might be that any law passed would hurt some and benefit others, but as far as the society was concerned it had endeavored to be as fair as possible.

Unconsidered Aspects of Headlamp Lighting

J. R. Cravath said that the results of the test in one way were exactly what might have been expected. The surprising thing was that in driving at night they were constantly passing cars with much more glaring headlights than what had been declared to be the tolerable limit by the observers. If we limited glare in accordance with the results of the test on that point, we would not have good driving lights. He had made some experiments on his own account and dwelt on what he described as some unconsidered aspects of auto headlighting. When two cars approach each other on the road at

night, owing to the illumination from both sets of headlamps, the road between them is unusually well lighted. When the cars approach closely to each other there comes a point when neither driver can see past the other car, and this is not necessary because for an instant the driver can steer his car by memory. In the tests the conditions were different, and most of the observers at least tried to see past the approaching lights. In St. Louis, Mr. Cravath said, a serious attempt is being made to see that all cars have their lights adjusted for the proper illumination. The cars are taken to the municipal test station and photometric measurements are made to determine that their candlepower on a 42-in. level does not exceed 1200.

From some remarks made by one member of the Illuminating Engineering Society it appeared that the society in its endeavors to arrive at the scientific basis for headlight illumination had met with some opposition on the part of manufacturers of devices for controlling illumination. He said that some time ago he had seen in the newspapers a statement from the New York Board of Health to the effect that the nutritive value in milk was about twice that in steak or eggs, value for value, and he said that butchers and egg dealers might not be pleased at such a statement, but the Board of Health disregarded this fact and came right out with the information in its possession. A similar stand should be taken by scientific societies like the Illuminating Engineering Society.

Slides were shown of test results obtained from a number of different headlamp lenses which were tested at the Electrical Testing Laboratory for the order of one maker of lenses. The method of making these tests was as follows:

The beam of a standard type of automobile headlamp was directed toward a white screen placed 50 ft. in front of the lamp. The filament was located in the reflector so that a beam of maximum concentration was secured, with the reflector axis passing through the 42-in. line, and the beam maximum measured. The lens was then inserted, candlepower measurements were made, the values obtained were attached to the screen and a photograph was taken of same.

This photograph shows the cross section of the beam and the distribution of candlepower as it would appear at a distance of 100 ft. in front of the headlamp. This horizontal line 42 in. above a level roadway passes through the axis of the unmodified beam and was divided into feet as measured from the vertical plane through this axis, and the vertical line was divided to show degrees divergence from the horizontal. Along this line were also indicated the distances at which light at each inclination strikes a level roadway. Light intensity values were shown on the photographs in thousands of candlepower. As the distribution of light is substantially symmetrical with respect to the vertical axis of the beam cross section, the intensities of one-half only were given.

Following are the candlepowers with the ordinary clear lens and the different special lenses, and the direction of the axis of the beam with the special lenses.

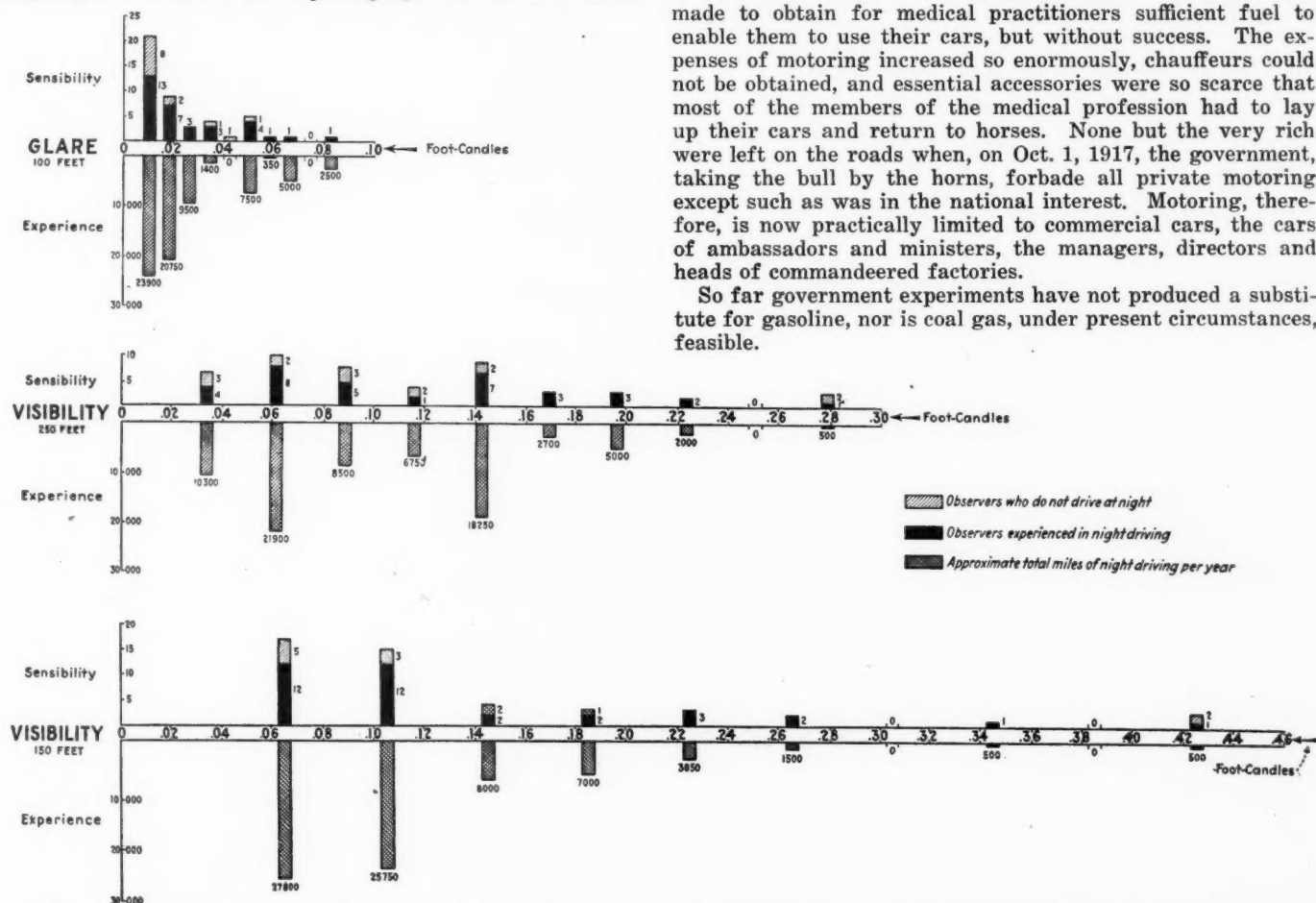
Type of lens	C.p. without	C.p. with	Direction of
A	50,000	26,500	2½ deg. downw.
B	50,000	27,000	2 deg. downw.
C	50,000	10,300	3½ deg. downw.
D	50,000	7,900	3½ deg. downw.
E	50,000	7,700	2 deg. downw.
F	57,000	2,620	horizontal

Decline of Private Driving in Italy

ALTHOUGH Italy joined the Allies in May, 1915 (writes a correspondent of *The Autocar*), it was not till the following year that the private motorist began to feel uneasy. This feeling was first caused by the absence of gasoline from the roadside garages which, under the support of the Touring Club of Italy, had become such a convenience. Even earlier the scarcity of fuel had been painfully apparent, and with the war as an excuse the price rose from 48 cents to \$1.50 per gallon.

The scarcity reached its acutest stage early in 1917, when supplies were rationed for some months. The rationing scheme, however, was evaded to a great extent by rich owners of automobiles and made little difference. An effort was made to obtain for medical practitioners sufficient fuel to enable them to use their cars, but without success. The expenses of motoring increased so enormously, chauffeurs could not be obtained, and essential accessories were so scarce that most of the members of the medical profession had to lay up their cars and return to horses. None but the very rich were left on the roads when, on Oct. 1, 1917, the government, taking the bull by the horns, forbade all private motoring except such as was in the national interest. Motoring, therefore, is now practically limited to commercial cars, the cars of ambassadors and ministers, the managers, directors and heads of commandeered factories.

So far government experiments have not produced a substitute for gasoline, nor is coal gas, under present circumstances, feasible.



Test results plotted, each observation being given a weight proportional to the observer's night driving experience

Co-operative Spirit Holds Employees in Flint Industries

Industrial Fellowship League Has Made It Pleasant for the Workers and All of Them Take Part in Its Activities

THE co-operation of the factories at Flint, brought about through the efforts of the Industrial Fellowship League, has led to more agreeable conditions for both the companies and the workers. The men are better satisfied with their work and have little inclination to leave their places of employment or the city. Since the organization of the Industrial Fellowship League a new atmosphere exists. The League has bred germs of industrial activity and progress that have been contagious, and everybody has been inoculated with the desire to help his fellowmen.

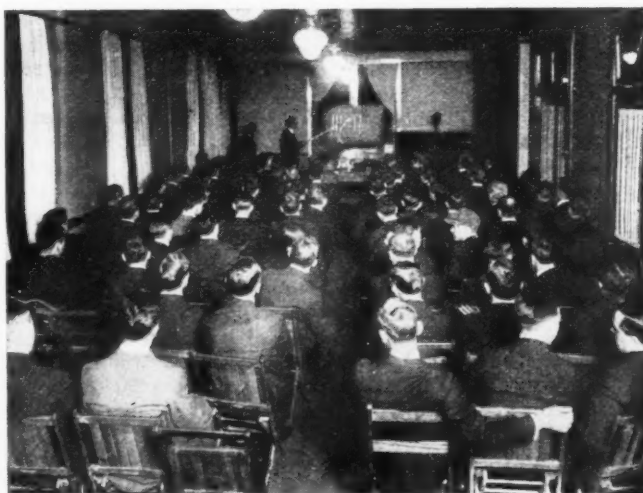
Few Amusements in Small Cities

Before the organization was formed, men, especially newcomers, found it difficult to get acquainted. Flint, unlike large cities, had but few places of amusement, and many soon became dissatisfied with their situation and moved to a larger city where they would perhaps be better satisfied. The need of something to keep the men satisfied was long felt. Although means of amusement are demanded by the average person, their presence is not always an assurance that men will not move away. If men are helped in their work they will take such interest in it that the thought of moving will not occur to them.

Although the prime purpose of the League is to make things pleasant for every man in the factories, the League has also been the means of retaining men who otherwise might have left their places of employment. The percentage of turnover of a factory in a small city within close proximity to a larger one is usually greater than that of the large city's industries.

The factory executives of Flint think well of the League and are co-operating with the work in every way they can.

All the factory employees of Flint are members of the Industrial Fellowship League and all the work of the organization is done by the employees themselves. Three times a week noon meetings are held at various factories. At these a speaker may be engaged to talk on thrift, or



A meeting of the Technical Society

how to purchase real estate, or any other timely and helpful subject; or the noon hour may be spent in a "sing." The men enter heartily into the spirit of the meeting. Many of them say that nothing could give them greater pleasure. Frequently, but not too often, ministers are asked to give a talk to the men at noon.

The work of the I. F. L. comprises several individual activities. It conducts athletic meetings, educational work, a technical society, shop meetings and social events; it issues a factory newspaper, runs factory stores and furnishes factory lunches. Each of these branches of its work is in charge of a special committee and is self-supporting.

Thirty-seven Plants Represented

Thirty-three plants of Flint are organized. Each one is represented in the I. F. L. by a man elected by the employees of that factory. Great excitement prevails each year when these representatives are elected. At the last election there were one hundred candidates for office, while only thirty-seven representatives were required. One shop had eleven candidates for the job. A representative is elected for every 1000 employees of a factory. Some factories have two or three representatives, according to the number of men they employ.

The election is always a genuine campaign. Posters and advertising reading, "Vote for John Brown," etc., are issued, and excitement rises to intense heat. The elected representatives constitute the executive board and they select the necessary



Part of the starting, lighting and ignition class. The students get practical instruction

committees. W. G. Chrysler, president of the Buick Motor Co., is chairman of the I. F. L.

The School of Automobile Trades offers several night courses of study, such as factory electrical work, automobile assembly and maintenance, starting, lighting and ignition service, mechanics, metallurgy and heat treatment, geometry, foundry practice, mechanical drawing, tool making, body painting, enameling and finishing, algebra, arithmetic, and penmanship and business English. The cost of these courses is nominal—just enough to defray expenses. The sessions are held in the Y. M. C. A. building, and each course is taught by the best man securable in the particular field.

The school aims to supply men with all-around knowledge about automobiles. It is a fact that men may know chassis assembly perfectly but know nothing about motor assembly, and vice versa. Through the instruction received at this school men have been promoted several times in their own factories and several have proved valuable to the Government in the aircraft and truck divisions. The school gets very good co-operation from the local factories. Recently the Dort Company sent a chassis to the class room. This was torn down, built up and knocked down again. At the time of the visit by the representative of AUTOMOTIVE INDUSTRIES there were three engines in the class room, a Chevrolet four, a Buick six, and a Chevrolet eight. It is aimed to stay away from theory as much as possible in all classes. Most of the instruction is practical.

Engineers Also Cared For

A lack of engineers was felt in Flint and to remedy this the Technical Society was organized. There are two classes of membership. The active membership is made up of men instrumental in design and construction of automotive vehicles; the associates are those interested in design and construction of automotive vehicles. Lectures are held every second week and a council decides on the subjects to be discussed. Good speakers are always engaged for these meetings. No admission fee is charged, as the society is supported by dues paid by members. The students of the Trade Schools are urged to attend these lectures. Meetings are held either in the Y. M. C. A. building or a factory. Some of the subjects chosen by the Council and discussed by speakers this last year are as follows: "Iron and Steel Metallography," by Clark H. Day, Heat Treating Department, Buick; "Temperature Measurement and Control," by J. E. White, Electrical Department, Buick; "Fixed Jet Carburetors

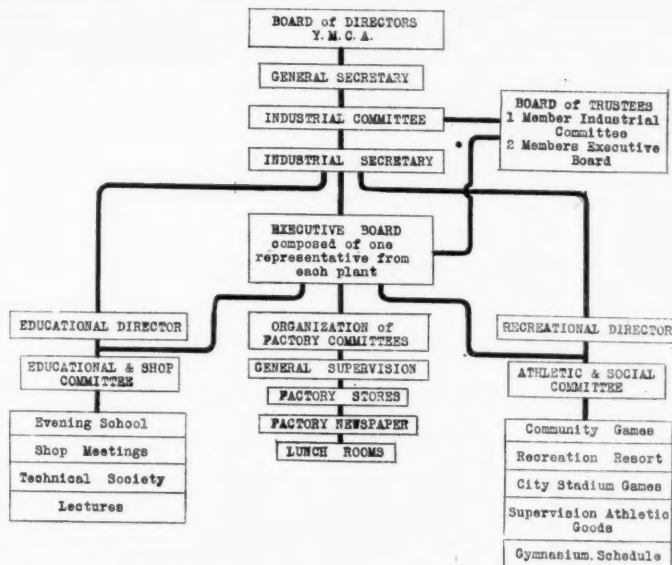


Chart showing organization of the League

and Efficiency in Carburetion," by P. E. Micquelson of Zenith; "The Spark Plug and Its Relation to the Development of Airplane and High-Speed Gasoline Motors," illustrated with moving pictures, by B. W. de Guichard of the Champion Ignition Co.; "Aerial Locomotion and Its Motors," by Etienne Planché, chief engineer, Dort Motor Car Co. Space does not permit us to quote more subjects; suffice it to say that all the subjects were of equal importance and the attendance at each meeting was high.

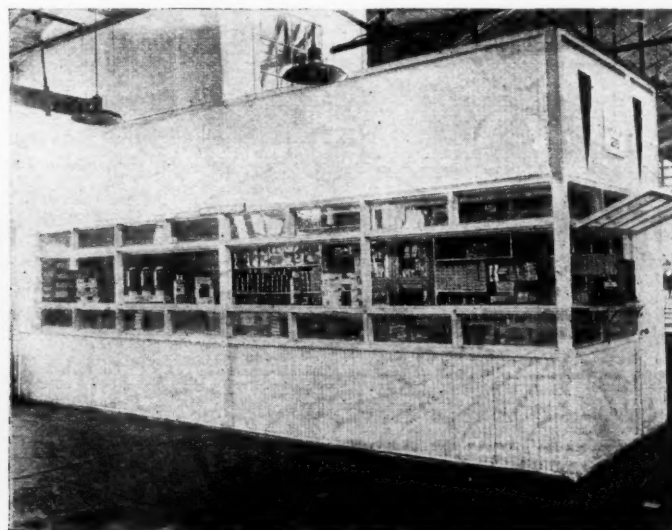
Athletic activities play a big part in the work of the I. F. L. Recently a big event was staged in the gymnasium of the Y. M. C. A. An admission of 25 cents was charged and the proceeds went to the Red Cross. The hall was filled to capacity. That the men give some thought to these affairs is reflected by the novelty of the events. One wrestling match, a sparring match and two tugs-of-war were going on simultaneously on the same floor. At the same time a clown was performing antics among the participants.

A tract of 100 acres, 12 miles from Flint, has recently been purchased by the I. F. L. and the greater part of it will be transformed into a recreation field. A portion is now devoted to farming and yields some revenue to the League. Several cottages will be built on the lake bordering the land, and members will be given the opportunity of leasing these at nominal rents. Good fishing is

(Continued on page 800)



A class room with a geometry class in session



A view of a typical factory store

Persistency Will Succeed in Liberty Loan Drive

Do Not Let Activity Cease Until the Drive Is Over—The Government Wants a Big Over-Subscription as a Blow at Germany's Morale

IF THERE is any advice to be added to the story which has been told in the previous issue of AUTOMOTIVE INDUSTRIES on how to handle the Liberty Loan campaign, it is to "Keep Everlastingly at It."

By this time nearly every factory has adopted some method by which it is co-operating with the government in this loan. Do not let the campaign die down. Finish strongly. There are many men in every organization who are tardy about recognizing their duty in a matter of this kind and it takes persistent effort to bring them into line. If 60 per cent of your organization have subscribed go after the other 40 per cent with redoubled energy.

Take full advantage of the municipal team which controls your district. These men will be glad of the opportunity to visit your factory from time to time to address the workmen and officers for the purpose of bringing home to them the necessity for subscribing to this effort. Make use of the posters sent out by the government to help in this work. These posters have been contributed by the best men in the field and they are strong enough to help substantially in moving the men who are hardest to convince that regardless of how small their income may seem in comparison with expenses, they can afford to save some of their money, when this saving is helping to shorten the war.

If you have not put on one big Liberty Loan Drive Day at your plant you have missed a good opportunity which you should at once take advantage of. Get the members of the Board of Commerce Team, or any other bond selling organization in your vicinity, to appoint one or two speakers for that day. Get a band to contribute its efforts if you can do so and go through the plant with the idea of signing up every man who has not already contributed. This plan is working out to very good advantage in Detroit, where the board of com-

merce is making a list of the factories and making a complete drive on each of them during at least one day.

If you have teams in your plant which are working in competition, spur them on to final effort. Encourage the teams which are behind to come forward and beat out the leaders. There are many good ideas which can be worked out in the team system of handling the sales. The photograph herewith showing the Timken teams, giving the percentage in terms of batting average instead of per cent of quota, makes an interesting and effective plan.

The daily newspaper which you are using to further the sales of the bonds should not be permitted to lose its vigor. This paper should be brimful of enthusiasm and every issue should bristle with facts regarding the success of the loan. If you are having a special day at your factory, which you should by all means have, let the issues of the paper just previous to that lead up with enthusiasm to the final day on which the drive is to take place.

Sample of Speech

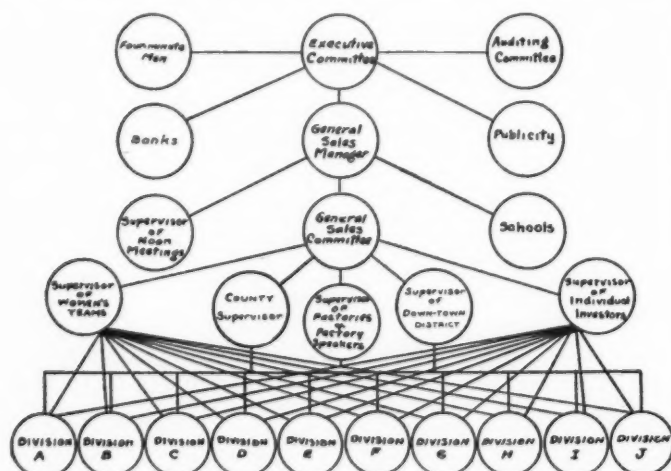
There are almost an infinite number of reasons and types of speech which can be used to advantage in soliciting subscriptions for the loan. A good example is the following, which was given in Detroit by Lee Anderson, vice-president of the Hupp Motor Car Co., in his work as chairman of the Publicity Committee:

There are three reasons why every person in the United States of America should buy Liberty Bonds:

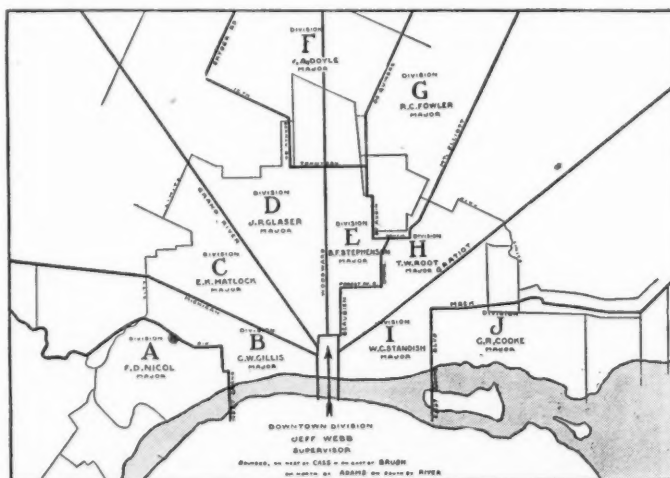
- First, patriotism;
- Second, investment;
- Third, common sense.

And perhaps the greatest of these is common sense, because it comprehends both of the other reasons.

Nearly four years ago there broke forth in Europe a diseased, semi-paralytic and utterly inhuman monster. In the long, bloody months that the civilized world has been fighting



The city of Detroit has completed its Liberty Loan Campaign organization and it is planned out as shown in these illustrations



this thing we know as "Germany," we have come to realize that this outburst was no sudden eruption of temper, no sudden spasm of lust—but simply the ultimate manifestation of an insane plan which has been propagated in the German mind for more than 25 years.

That plan preconceived the conquest of the world. Its slogan was "Deutschland über Alles." And it was no mere fanciful slogan—it was the thing that all Germany expected to see realized among all of the nations of the world.

Let us not fool ourselves for one minute. We are not fighting merely because this Thing sank our ships, interfered with our rights as a neutral commercial nation, or killed our citizens. If that had been our excuse, we would have been at war within 24 hours after the sinking of the Lusitania. The real reason for the war against Germany is self-defense.

This Thing which destroys, loots and rapes innocent nations; which holds sacred nothing that even the least civilized of peoples hold sacred—this Thing which carries the bodies of babes on its dripping bayonets; which crucifies priests and drives women into the vilest of slavery—this Thing must be wiped from the face of the earth, else it will accomplish its mad purpose of establishing above all else in the world its "Kultur," which is barbarism.

Would you fight to protect your home from an insane man whose purpose was to burn it? Would you struggle with a mad dog that was attacking your children? Would you assault a degenerate brute who was striving to abuse your wife?

Then put back of your fight against this German horror everything you have to give—yourself, if you are of fighting age; your brother or your son, if he is of fighting age; your dollars, whether or not you are fighting.

You may say, "But suppose, in spite of all my sacrifices, Germany wins."

Then, I tell you, it makes no difference—dollars, homes, life itself are worth nothing if Germany achieves the thing which has been its ambition for 25 years—world dominance. The penalty you as an individual will pay if Germany wins a complete triumph will be no greater for having fought to the last ounce of your strength and to the last dollar of your earnings. If Germany wins world dominance, the penalty you will pay will be no less simple because you have remained passive and not put your full strength against Germany.

This is no mere theory, it is fact, proved in thousands of villages and towns in Belgium, France, Serbia, Roumania and Russia. It is a matter of record in the walls of hundreds of thousands of homes in every part of Europe where the heavy hand of war has been laid; it is a matter of certain knowledge and definite truth in the homes of millions of people who have felt the blow of the German fist.

This is common sense.

I make no plea for patriotism. If there is a man, woman or child who looks at the Stars and Stripes and says to himself, "That is my flag," and who still will not buy Liberty bonds, I say that person is not worthy the name "American"; that person is not worthy the association of anything but Germans.

It can't be possible that the great American people, knowing the purpose for which this country has gone into war, knowing its avowed intentions in behalf of the helpless peoples of Europe and knowing its definitely altruistic purposes in giving the world the freedom and democracy we enjoy, needs to be taught patriotism. Of course, it is the patriotic duty of every person to buy Liberty Bonds; it should be the patriotic pleasure of every American to buy Liberty Bonds to the fullest possible extent his income and resources will permit.

That Liberty Bonds are a good investment now goes without saying. Liberty Bonds of the United States of America are backed by the greatest security, by the greatest wealth of any investment in the world. The United States Government has never repudiated a debt, and on the other hand it has many times paid the debts of others which could not legitimately be charged to its account. You are buying in Liberty Bonds the promissory note of an honest government, of a government which does not loot a vanquished nation as does Germany, but which buys and pays at highest market price for anything that it wants. You can't leave

TEAM	SCORE	BATTING AVERAGE
1 GIANTS	17,100,000	.345
2 RED SOX	17,100,000	.345
3 SENATORS	15,150,000	.345
4 PIRATES	2,700,000	.345
5 CUBS	15,300,000	.345
6 TIGERS	12,300,000	.345
7 THE BRAVES	16,000,000	.345
8 INDIANS	15,300,000	.345
9 ATHLETICS	6,750,000	.345

DONT BE A SLACKER.

By way of keeping up interest in its Liberty Loan drive the Timken company had an immense sign giving the scores of the various departments

your children and your children's children any material wealth so secure, so stable in its value as Liberty Bonds.

If these are not reasons enough for buying Liberty Bonds, talk to any bond salesman and he will give you a thousand and one more reasons equally good.

Speeches modeled after this one, backed up with individual talks by bond salesmen, the display of posters, and persistent campaigning will bring results.

How the campaign is being handled in Detroit is shown by the map herewith and the organization chart. It will be noted that the schools and factories are relied upon most strongly in this industrial center.

Flax for Aircraft

THE closing of the Russian ports and the growing demand for flax for aircraft fabric has prompted the British government to create a Flax Production Department on the Board of Agriculture. The intention is to make efforts to get 10,000 acres of the crop sown in the coming spring so as to insure an adequate supply for the year and to provide seed for next year's requirements. Flax growing was at one time extensively practiced in England, but with the general decay of agriculture which followed on the growth of industrialism it became comparatively a defunct industry. Yorkshire, Lincolnshire, Somerset and Fife were the chief centers, and it is in these counties that flax growing is to be principally revived. In the Yeovil district of Somerset and at Selby flax growing is still practiced to some extent, and in these places the British Flax and Hemp Society and the University of Leeds have done much to encourage it.

The terms that are being offered to farmers in suitable districts seem to be such as ought to induce them to carry out the board's desire without difficulty. The government is to pay \$41 per ton for the total crop of seed and straw, and as a fair yield is from two to three tons per acre, and the seed for sowing is to be supplied free, there ought to be a very fair return to the farmer.

Tractor Engine Lubrication and Lubricating Oils*

Lubricating Systems in Use on Tractor Engines and Their Dependence on Fuel Used and Its Carburetion—A Series of Tests Carried Out to Determine Suitable Oils for a Particular Tractor Engine

By W. G. Clark, M.E.

LUBRICATION is one of the most important factors entering into successful tractor operation. Fully 75 per cent of tractor field troubles can be directly or indirectly attributed to faulty lubrication.

Lubrication in general covers such a broad field that a paper of this kind must necessarily be limited in scope, so that I shall touch only upon that part of the subject that has to do with the motor and shall dwell especially upon the relation of lubrication to carburetion and ignition and upon the importance of proper oil selection. I think that the latter subject, that of proper oil selection, offers a big opportunity for more extensive experimental work than has been done in the past, because it is the lack of data on this subject and the neglect of manufacturers to recognize and emphasize its importance that are responsible for a large part of field lubrication difficulties.

In designing a motor the method of oiling should be determined by the type of motor and its class of service. Unfortunately the deficiencies of engine design and of fuel vaporizing methods often necessitate the selection of an oiling system which may not be the best for the particular type of motor on which the designer is thus forced to use it. This is particularly true of some horizontal motors which introduce the fuel in a comparatively raw state and rely largely on compression for vaporization. Under such conditions vaporization can at best be only partial, which prohibits the use of anything but a non-circulating system, because of the certainty of oil dilution.

There are many systems and combinations of systems used in tractor lubrication. I do not intend to enter into a discussion of oiling systems in general, but wish to touch briefly on a few of them to bring out my points.

Wick Oiler Obsolete

The old time wick oiler which was used successfully on some of the first motors has become obsolete with the advent of heavy fuels and modern oiling methods. It has been supplanted in the horizontal motors by the self-contained, single-flow force feed and the external unit mechanical oiler. Naturally the horizontal engine is not adaptable to the splash system, but if it were, the methods of carburetion for low grade fuels used on some of these motors would prohibit its use. Since the oil is used only once, a heavy oil consumption must be expected. Yet, where proper carburetion methods are employed these mechanical oilers and non-circulating systems are as efficient as any other. Some vertical motors use mechanical oilers for similar reasons, which, it seems to me, is attempting a cure without getting at the cause of the difficulty.

The circulating force feed, the splash and various combinations of these are by far the most commonly used in vertical tractor motors. The splash system is especially easy to regulate, easy for the average operator to understand and care for and when unhindered by fuel troubles is economical and well deserving of its present wide use and popularity.

The selection of an engine oil, just like the selection of an

oil system, ought to be determined by the type of engine and the service required, and yet we find thousands of tractor operators using any oil which is sold as an engine oil, because they think that if they buy a so-called motor oil and pay a big price for it, it must be all right. I know of no greater fallacy in the tractor field to-day than this very common belief that any oil is good oil if you pay enough for it or buy it in a sealed tin. The farmer is not altogether to blame, because from the practical standpoint there are no tests which he can apply to determine an oil's suitability for his motor without actually trying it, which often proves a costly experiment. Too little attention has been given by the tractor manufacturer to find out the best oils for his motor and to insist on their use. This should be done thoroughly and accurately by every tractor maker, if only to insure the satisfactory performance of his product. I know of many tractors that have been unjustly condemned simply because the service man in delivering the machine failed to impress on the purchaser the importance of correct oil and care.

Low Grade Fuels Interfere

The increasing use of low-grade fuels has drawn more attention to the oil question, and we now find that some of the tractor people are devoting more space in their instruction books to this long neglected but vital factor. Some of them were forced to do so as soon as they commenced to use low-grade fuels. A horizontal motor in which the fuel is not thoroughly vaporized before admission to the cylinders must use a very heavy bodied oil to prevent immediate and excessive wear, because the dilution of the lubricant by the ever present raw fuel lessens its lubricating qualities so rapidly that a heavy bodied oil must be used to furnish lubrication after its partial dilution. The fact that kerosene acts as a solvent of oil more readily than gasoline partly accounts for the fact that with a heavy bodied oil one of these engines will actually run easier and better on kerosene than on gasoline. The thick heavy oil is not cut by the gasoline giving greater piston drag and less complete combustion of surplus oil, often resulting in greater carbon formation and less power on gasoline.

To illustrate this, I will cite a case that came under our observation some time ago. A firm which manufactured a large single cylinder horizontal engine wrote us rather enthusiastically that they were developing considerably more power on kerosene than they could get with gasoline even when the gasoline was unheated. We investigated and found that such was a fact so long as they used the very heavy oil necessitated by the defective carburetion of the kerosene. However, when a lighter and more suitable oil was used for gasoline the situation was reversed, which serves to show how easily one can be led into erroneous conclusions because of the close relation of carburetion to lubrication.

The selection of suitable oils for any given type of motor should be made after careful laboratory tests supplemented by equally careful field tests. The right kind of laboratory tests require considerable apparatus and are very costly, so that certain recent developments in physical chemistry, of means by which the performance of any oil can be accurately

*Read before the Minneapolis Section of the S. A. E.

predicted, will do much if adopted toward eliminating some of our lubrication difficulties.

In 1913 and 1914 while I was connected with the experimental department of the Emerson-Brantingham Company, with E. R. Greer, I conducted some tests on lubricating oils by a new method which yielded some interesting results.

These tests were not intended as a scientific investigation of lubricating oils for gas engines in general, because they were confined to one engine and one speed, so that the results while accurate in method are applicable specifically only in so far as that engine is concerned. However, I believe the method may be of interest, so I will outline it in part.

Oil Tests for Tractor Engine

The following description of apparatus and procedure is a partial excerpt from my report made at the time, for which I am indebted to Mr. Krieg of the Emerson-Brantingham Company:

The motor used in these tests was a standard stock engine 5 by 7-in. four-cylinder, four-cycle, vertical, designed for heavy duty tractor work. It was placed in the laboratory in September, 1913, and used for experimental work until middle of December. By that time all the bearing surfaces had been thoroughly worked in and the friction of the moving parts had become practically constant. The engine was thoroughly cleaned and scraped, and the connecting-rods, valves, timing, etc., checked over and put in perfect condition. Since the success of any comparative test depends upon the exact duplication of every condition for each successive test, it was considered necessary to remove the water pump and governor. The water pump was removed because it was mounted on the crankshaft with an adjustable stuffing box which was likely to vary in adjustment and so change the friction of the engine. The governor was replaced by a rod which locked the throttle wide open where it remained throughout the duration of all tests.

Description of Oiling System

The oiling system was of the pump feed, circulating splash type, in which the oil is drawn by a cam driven plunger pump to the crankcase from the oil reservoir and return. Thermometer wells were placed in the oil reservoir, intake manifold and in the motor housing between cylinders 2 and 3, projecting down into the crankcase.

The cooling was accomplished by an electric motor driven gear force pump, circulating the water from a large supply tank and cooling screen or through an open 52 gallon barrel as desired. By an arrangement of valves and piping it was possible to control the water temperature and regulate the flow. Two pressure gages in the cooling system also made it possible to maintain the same rate of flow throughout all the tests. Thermometer wells were placed both in the inlet and outlet of the cooling system and oil baths were used for the thermometers in all cases.

The fuel used was 57 deg. motor spirit purchased all in one lot to insure uniformity. It was fed to the carburetor by gravity from a 20 gallon tank with provision for obtaining the fuel economy accurately.

Electric Dynamometer Used

The dynamometer was a Diehl electric cradle type machine with which small variations in load could be measured ranging from 0.0038 hp. at 100 r.p.m. to 0.057 hp. at 1500 r.p.m. The action of this machine depends upon the electric reaction between the field and armature and the amount of torque is registered by an arm with a knife edge acting at a fixed distance from the shaft center upon a very sensitive Fairbanks scale. Since the torque is dependent upon the speed of the armature and the strength of the field, which was separately excited and under perfect control, the accuracy is independent of the electrical efficiency of the machine, which allows a wide range of speed and load without the error involved in the use of efficiency and calibration curves.

The speed was obtained from a Schuchardt & Schutte tachometer driven from the dynamometer shaft and checked by a Veeder counter on the same shaft.

The actual testing period for each oil was about 10%

hours and was divided into three parts, i.e., cold friction test, power test and hot friction test, run in the above order.

After each oil was tested the engine was subjected to a thorough cleaning to remove all traces of the oil. The oil reservoir was drained, washed out with kerosene and wiped dry.

The crankcase was similarly treated, and then clean kerosene was put into the oiling system. The engine was then driven for a time by the dynamometer until the kerosene had washed all through the bearings, after which the whole system was again drained and wiped out. This process was repeated with clean kerosene until the kerosene, when drained from the engine, had no trace of oil. The engine was then allowed to stand several hours to drain thoroughly, after which it was wiped dry before putting in the new oil. This cleaning process was followed invariably after every test.

Friction Horsepower of Cold Engine

Part 1 consisted in measuring the friction horsepower of the motor with the new and unused oil. This was done by driving the motor at its rated speed of 700 r.p.m. with the dynamometer and obtaining the change in friction as the heat of compression warmed the oil and jacket water. Friction power readings were taken every fifteen minutes together with temperature readings from the crankcase, oil reservoir, water jacket, intake manifold and room. The fifteen minute readings were continued until the friction became practically constant and the temperature changes so small as to be inappreciable.

This part of the test might have been continued until all the temperatures became constant, but the value of the readings would not have been worth the time required to get them.

Conditions Maintained Constant

By regulating the speed of the water pump and watching the pressure gages in the water line, it was easy to exactly duplicate the rate of flow of the cooling water for each test, so that any change in the heating or cooling rate in a test could be directly attributed to a thermal difference in the oil itself. This idea of duplication of every essential condition was kept constantly in mind throughout the tests and every effort was made to eliminate all variables, so that all changes of friction or fluctuation of any sort might be charged to the lubricating oil.

The object of Part 1 was to measure the comparative lubricating values of the oils when new; and when considered in conjunction with Part 3 it forms a good basis for the comparison of the stability of an oil's lubricating value.

Full Power Run

Part 2 consisted of a five hour continuous power run with wide open throttle and maximum load. Five hours was chosen because it was estimated that when the motor ran under full load for five hours continuously, the oil had been subjected to the same amount of work as in an ordinary day's run in the field. During this part of the test the temperature of the cooling water was maintained at about 180 deg. for all the oils, readings were taken as in Part 1, and the fuel economy was ascertained.

At the end of the five hour run the cooling system was heated to boiling temperature and the amount and rate of flow of the water regulated the same as in Part 1. At this point the fuel and ignition were cut off and the engine kept running at the same speed by the dynamometer. Friction horsepower and temperature readings for the first twenty minutes were taken at two minute intervals, because of the very rapid temperature drop and friction increase during the first few minutes. The intervals between readings were later increased to fifteen minutes as in Part 1 and the run continued until the oil and water cooled down to a point 10 or 15 degrees above the final readings in Part 1.

Part Three Most Important

This part of the test was really the most important of the three, as it showed the difference in lubricating value of the various oils after use in the motor and exposed to heat. This

serves as a measure of the stability and lasting qualities of the oil.

At the end of Part 3 the oil consumption was measured and a pint of the used oil taken for analysis.

Upon the completion of the tests, check runs were made on several of the oils to ascertain if there had been any change in the motor friction. This second series of tests checked so closely with the originals that we were confident that the motor had not changed.

Twelve Oils Tested

There were twelve oils used in these tests, some especially compounded for that motor and the others being common commercial motor oils such as are used in tractor work. No attempt was made to obtain oils of any special base, so that of the twelve tested, two were from Pennsylvania paraffin crudes, five or six from mid-continent crudes and the rest from various semi-asphaltic base crudes.

The data acquired were plotted in diagrams in three groups called the Temperature-Power, Time-Temperature and Time-Power.

The Temperature-Power group shows the variation in friction horsepower of the motor with the change in temperature during Parts 1 and 3.

The Time-Temperature group shows the time rate of temperature change of the different oils during Parts 1 and 3.

The Time-Power group is merely a graphical representation of the entire test in its chronological order, showing the variation in friction and maximum power throughout the tests.

The temperatures used in plotting these diagrams were those of the water jacket and crankcase, a different set for each temperature.

Notable Difference in Friction

The variation in the friction of the motor with the different oils was quite marked and easily measurable. It was interesting to note that two oils of the same gravity and viscosity showed as much as a horsepower difference in friction of the motor and that two oils which gave practically the same results in Part 1 were entirely different after the five-hour subjection to heat.

We used one oil which was similar in physical specifications to several others, but is used chiefly for line shafting, just to see how it would compare. It gave very favorable results in Parts 1 and 2, but Part 3 showed that the five-hour power test had almost totally destroyed its lubricating qualities.

If there were such a thing in petroleum derivatives as an ideal oil, its temperature power diagram would be a horizontal line, or in other words, its lubricating value would be the same at all temperatures within the limits of its use in motors. It is interesting to note that these oils whose temperature-power diagrams had the least slope, proved to be the better oils.

Time-Temperature Slope Invariable

In the Time-Temperature group the general slope of all the curves was practically the same, although the maximum and minimum points were different. Since the slope of these curves is a measure of the heating and cooling rates during the various tests, the uniformity of slope indicates that the rate of circulation of the cooling water was uniform. These diagrams might also be used to indicate the thermal capacities or insulating qualities of the different oils, although sufficient data were lacking to warrant any conclusion along that line.

The comparative values of the oils were based on three factors: lubricating efficiency, oil consumption, and fixed carbon and insoluble content. Lubricating efficiency was subdivided into three parts: first, average maximum power delivered by the motor with each oil; second, the change in friction horsepower per degree change in temperature; third, the average friction between the temperature of 90° and 200°. By giving the three separate parts of lubricating efficiency equal weight with oil consumption, fixed carbon and insoluble content, lubricating efficiency as a whole comprises three-fifths of the total comparative rating of each

oil, which seems a fair proportion. I will not take the space at this time to detail further the methods of scoring used in these tests, as they are not of general interest. The complete report and all data were printed in *Internal Combustion Engineering*, London, of May 27 and June 5, 1914.

Oils Chemically Analyzed

Samples of each oil were taken both before and after testing in the engine and were analyzed by a chemist. A careful study of the properties of these oils in conjunction with the results of the tests fails to reveal any distinct relation between the physical properties of an oil and its value as a lubricant. The nearest approach to such a relation seemed to lie in the fixed carbon and insoluble content, as the oils which gave the best results had the least amounts of these elements. However, we did not feel justified at that time in drawing any such conclusion, but recent developments in the physical chemistry of oils indicate that our beliefs were not unfounded.

These tests proved to us that the performance of an oil in an engine cannot be predicted accurately by the usual physical tests as given in ordinary oil specifications. Of course, it is obvious that the viscosity and cold test must be suitable for the service intended, but that in themselves they are no basis for judgment of an oil's utility.

Actual laboratory and field tests are the best gages of an oil's suitability for an engine, and will continue to be until some newer and simpler method is worked out. Such a method, which is chiefly a chemical one, was described in a paper published in the February *S. A. E. Journal* by C. W. Stratford, entitled "Standardized Specifications for Lubricating Oils." I heartily commend to motor engineers a careful reading of Mr. Stratford's paper, as it seems to offer a simple and logical solution of many present difficulties in oil testing. Mr. Stratford corroborates our conclusions regarding the inefficiency of the customary physical tests as criteria of lubricating suitability, and he also emphasizes the importance of a minimum of carbonaceous insolubles in oils.

Care of Lubricating Systems

The care of the lubricating system can be summed up briefly in three words: Keep it clean! It seems to be a difficult matter to impress the fact upon the average operator that lubricating oil wears out and gets dirty even though protected from external dirt. The fact that tractor oil requires more frequent cleaning and replacing than automobile oil is often a matter of complaint and neglect because the average operator loses sight of the fact that the tractor oil is subjected to six or seven times the service that an automobile oil gets in the same length of time. The best oil that can be obtained for a motor will wear out and get gritty with use and must be thoroughly cleaned out to protect the motor bearings.

Putting fresh, clean oil into a dirty crankcase with worn out oil is a waste of good oil, as the old contaminates the new in a short time. The frequency of cleaning is augmented by incomplete or poor vaporization methods, because of oil dilution. It is a regrettable fact that too often a tractor operator gages the condition of his oiling system by the quantity of oil in it, rather than by the quality and condition of the oil itself, which accounts for many burned out bearings which were apparently flooded with oil.

Spark Plug Fouling

The spark plug question is worthy of mention in connection with lubrication. There are many good serviceable spark plugs on the market for every class of service, but many of them have been, and are, unjustly condemned because of poor selection, improper location, poor carburetion and dirty lubrication.

If the right type of plug is used, if the carburetion is even approximately correct, and if the lubricating oil is kept clean, a spark plug will never get fouled. That statement is backed by many personal experiences and hundreds of field reports. I know of case after case where spark plug trouble was totally eliminated by simply washing out a dirty crankcase and using fresh clean oil.

(Continued on page 800)

Pole Pieces for Magnetos

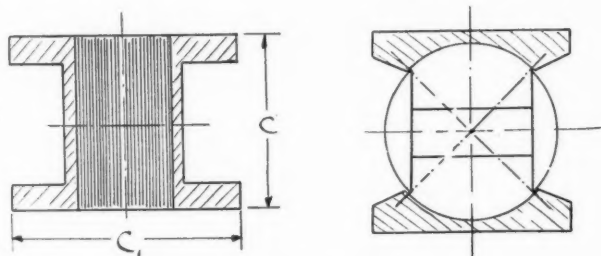
Unusual Shapes Given the Pole Tips with the Object of Widening the Peak of the Voltage Curve and Insuring a Hot Spark for Starting When the Spark Is Retarded

By Fred I. Hoffman

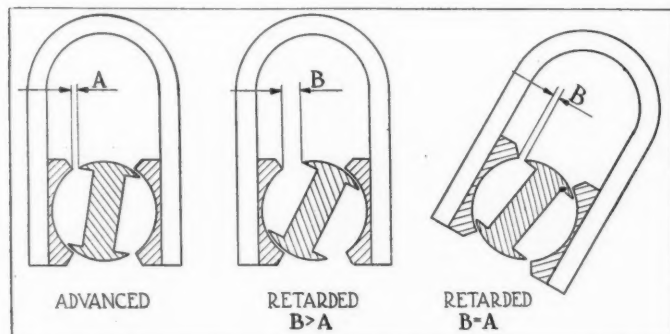
THE generation of a strong spark for easy starting without the use of any special device which is brought into action only temporarily has always been the most discussed problem of the magneto manufacturer. Quite rightly has it been said that the pole pieces have had the greatest amount of attention bestowed upon them, yet no epoch-making improvements or developments were made in this direction. In most cases the contoural shapes of the poles between the limbs and rotor were investigated, but little thought was given to metal composition and the ways the attachment of the exciting portion of the poles was made.

Shapes of Pole Pieces

In the standard magneto with rotating shuttle or H armature (Siemens) and with either single or double winding, the circumferential length of the inner faces of the pole pieces and armature horn part should extend to about 90 deg. each. Shortening or lengthening the one or the other by as little as a few degrees alters the flux distribution to some extent and thus influences the starting and running qualities. It has been found that a slight increase of the embracing part of the pole pieces over the armature horns when at right angles is of some advantage. If, on the other hand, the horn part C does not reach across the pole pieces, the magneto, while suitable for normal speeds, will not start the engine so easily at an average cranking speed.



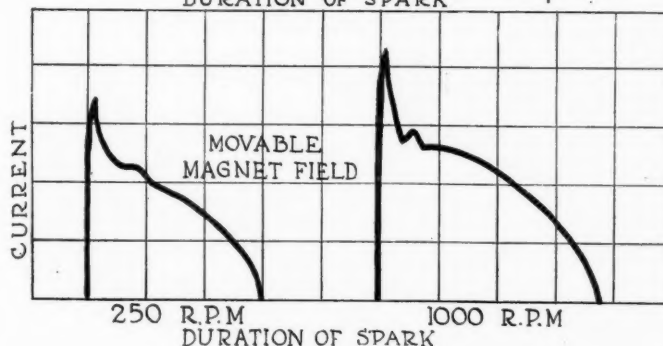
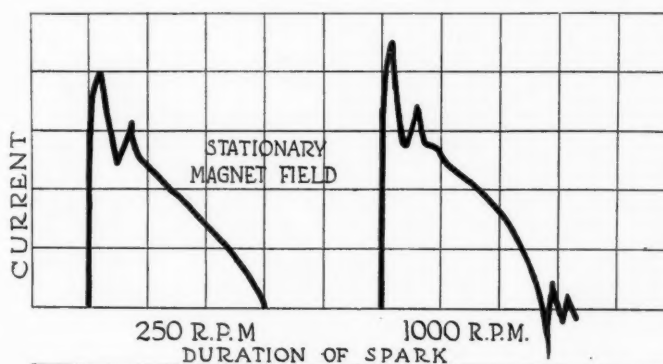
Proportions of armature core



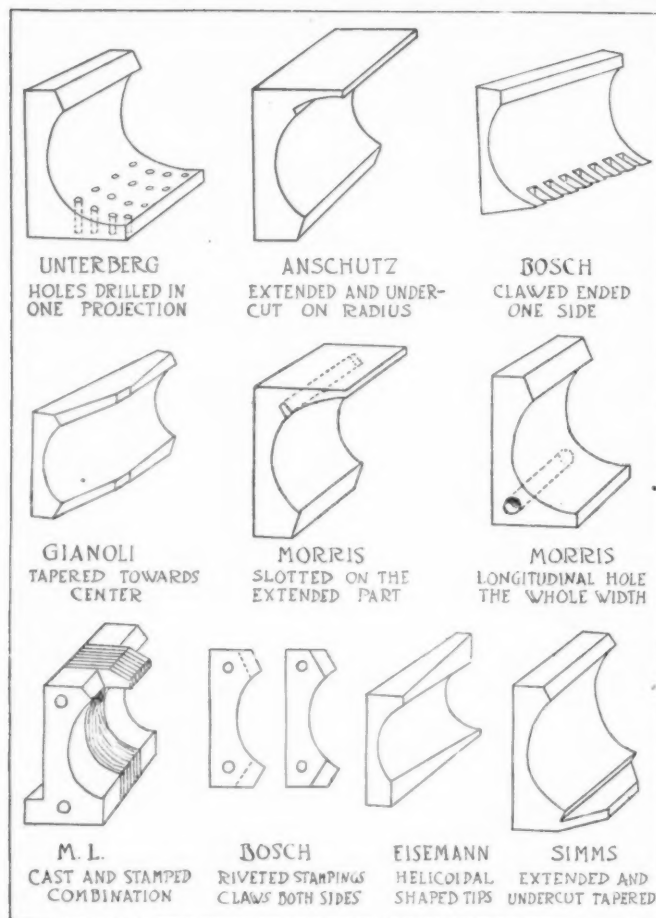
Relation of armature core to field poles at moment of break

The length of the pole pieces should be equal to the entire length of magnetic field, and the sectional area of same correspond to the quantity of iron in the armature and the magneto. In a well-proportioned machine designed on the most investigated and accepted French and German lines, the combined areas of the rotor show a ratio of approximately $C/C = 6$. Taking into consideration a useful induction of 3000 gauss, at its best the armature section must be about four times the magnet area.

In order to obtain the most efficient transformation at the lowest critical speed, sufficient for starting by hand, various devices, separate or integral with the magneto, special pole and armature sections, etc., have been designed. It is known that with the ordinary pole pieces and armature rotating in unison with the engine crankshaft, the variation of timing is dependent on the relative position of the contact breaker. The best spark can be produced only at one particular point in the field, and the spark in this position is too far advanced for starting. An engine is usually started with ignition retarded, so the best relation between field and coil core is past, and it is obvious that to get a sufficiently powerful spark a greater effort must be exerted than if the spark occurred in a more advanced position. This gradually dropping spark intensity towards the position of maximum re-



Oscillographs of sparks of magnetos with fixed and movable field frames



Shapes of pole pieces designed to give a flat peak voltage curve

tardation of induction can only be remedied by keeping the induction constant. This can be accomplished in two ways, by having the armature and contact breaker movable irrespective of the speed of the motor, or by advancing the field. Either of these arrangements will solve the problem. In order to show the advantage of better current distribution and the longer duration of spark produced by the movable field or armature machine, attention is directed to the oscillograph diagrams. The first curves represent the spark from a magneto with stationary field, the second a spark from one having a suspended field. Both machines were run at the same speed as indicated. The current is shown on the ordinate, the duration of firing on the abscissae. The possibility of using the maximum induction at any point within the firing range has been achieved and at the expense of some complications. In order to obtain similar advantages in the standard type of magneto with stationary field, specially shaped pole pieces, irregularly saturated, have been introduced. Working in an irregular field is, however, conducive to much quicker demagnetization, and it is this very question which the magneto manufacturer through the introduction of the inside lengthened pole pieces tried to solve at the same time. Reference is made here not to demagnetization by the sudden interruption of the current-flow through the break when the axis of the armature is perpendicular and in the best position between the field, which effect is small in any case, but to demagnetization by a late break after the maximum flux passage. The rush of current not being arrested immediately when the circuit is broken, sets up sparking, prolonging the duration of current increase and aiding in demagnetization. By the method of overlapping a slightly better field arrangement is obtained, but

the flux densities not being so carefully distributed, it is impossible to approach the efficiency of the machine with a suspended field or independently movable armature core.

As the contour of the pole piece and its relative value in magnetos with loose field or armature remains unaltered, it is not intended to go into details of such machines but to consider only the different principles embodied in that design. They have been sub-divided into several groups, of which a list follows:

MECHANICALLY-OPERATED DEVICES TO GET BEST INDUCTION IRRESPECTIVE OF POSITION OF CONTACT BREAKER

Impulse starter (spring operated)

Kokomo, Fuller, Sevison, Nimelion U. & H. Hoffman Swiss Co., Bosch.

Sliding armature

Bosch, Gianoli, Montlardon, Remy.

Geared system

Taunus, Hoffman.

Displacing field and pole pieces system

Eisemann, Montlardon, Mea.

Displacing pole pieces only

Gianoli, Dixie (Splitdorf).

SPECIAL SHAPES OF POLE PIECES TO IMPROVE THE INDUCTION IN CERTAIN POSITIONS WHEN ORDINARILY OF A POORER QUALITY

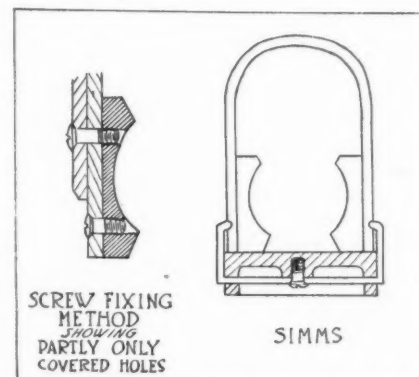
Gianoli, Eisemann, two Bosch pattern, Unterberg & Helme, two Morris, Simms, Anschütz, M. L.

The material ordinarily employed in pole piece construction is soft gray iron, stamped Swedish iron laminae, and occasionally cold drawn steel sections. Those magnetos having special shaped pole pieces are mostly of soft iron; Bosch, Splitdorf, M. L. and Simplex are the only makers using laminated poles in certain types of their machines. The Michigan and Jacobson are the only firms employing drawn steel.

The laminated pole pattern machines are obviously the more costly to make, and though preferable from many points of aspect, they are limited in use. Still, the mechanical difficulties involved are not insuperable as long as their manufacture can be carried out cheaply. The greater cost is probably the only reason why the cast pattern in different varieties has been adhered to.

The quantity of flux available at the portion of the pole pieces where wanted depends a great deal on how the path between field and the former is made, and not so much on the flux density actually existing in the body. Different constructive ideas are employed in order to obtain the best results. The most secure and effective way of fixing the magnets in position seems to be the old method of using countersunk screws.

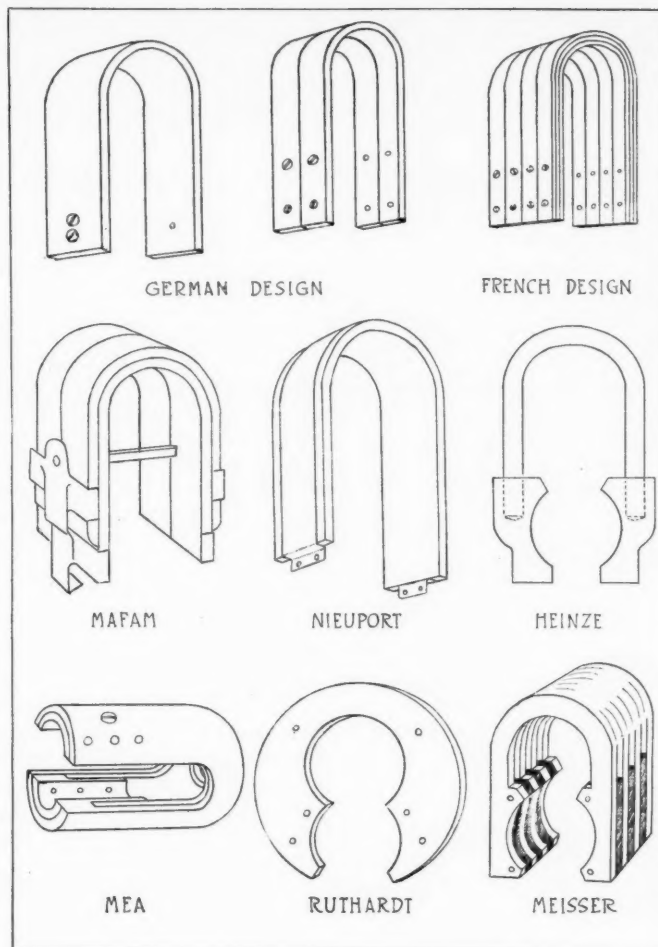
Up to one or two years ago European makers fitted single or compound magnets to the pole pieces with two screws each. Lately, however, on account of the use of one wide magnet instead of two or more narrower ones, the former of which extends over the whole length



Securing magnets

of the poles, one or two screws were used for the entire field. Owing to the lesser number of screw holes, the loss of sectional area of iron is decreased, for the cavities left at the points of the screws are never completely filled, as is shown in the accompanying sketch. Another advantage is the lower manufacturing cost due to tapping a smaller number of holes. Fixing the magnets by a single screw or bolt is not new. It has been employed in telephone inductors, medical apparatus and in the early magneto-dynamos made by various makers. The fastening by a brass or steel strap encircling the whole magnet is a French invention and was first introduced by the Nieuport and later by the American Berling Company. The German Mafam Company employs a stamped bridge on each side, while the Simms Company employs a single strap gripping the magnets through the lower part of the base plate. Riveting is also used to some extent, and this construction is favored by the Mea. When the magnets are of a circular section sinking them into the pole pieces is the best arrangement. The chief drawback of all these designs is the impossibility of making a very good and leakless connection between magnet and the pole piece. The limbs of magnets, owing to their length, are of slightly yielding nature, and therefore if fitted on pole faces too wide apart will not make good contact; if the reverse is the case, i.e., if too narrow, we get loose connection. In order to overcome the difficulties of the losses due through this defect Ruthardt made magnets and pole pieces in one stamping and riveted a number of laminations to the lengths required. The armature tunnel then was ground out to size. Owing to the flux circulation not being so favorable the design was abandoned. Another German developed a better combination with cast iron pole pieces interposed between the magnet stampings, but here as well the added efficiency did not warrant adopting this more costly construction.

From this brief review it should be obvious that the last word in magneto design has not been spoken.



Shapes of magnets and methods of fixing them to the pole pieces

Tubular Propeller Shafts Most Economical

ACCORDING to the Spicer Mfg. Corp., theoretical data on hollow shaft construction are useless when applied to the hollow shafts for automobile work. The reason for this is that vibration from outside sources is so great that the actual whipping speed is far below the theoretical speed given in the tabulations and text books on the subject. The best commercial tubing is also far from perfection, and this also tends to make the practical results fall far below what would seem to be good construction in theory. This makes it extremely hard for engineers to make their experimental data co-ordinate with theory and compels the designer on this work to leave himself a wide margin of safety to procure the best results.

The Spicer Mfg. Corp. have specialized in tubular propeller shafts for years, and they have come to the conclusion that the thickness of the wall is a matter to be determined by manufacturing conditions rather than conditions of service. Theoretically, the thinner the tube the higher the whipping speed. Practically, however, the thickness must be sufficient to make the tube substantial for working in the factory, and the most difficult operation is that of straightening the tube. It is obvious that the thickness of the tube must be such that it can be sufficiently straightened without denting. When this is accomplished, the tube in most cases will have ample strength so far as power transmission is concerned.

In the experience of the Spicer company, it has been found that in from 80 to 85 per cent of the cases concerned there is no extra factory cost in handling the hollow propeller shaft, assuming that the factory equipment is specialized for han-

dling tubing to as good advantage as solid shafts. In their own case, they no longer furnish solid shafts unless definitely specified and insisted upon by the customer. Such a large proportion of the product is tubular that the concern can furnish tubular shaft more readily and at somewhat less overall expense than the solid shaft. The other 15 or 20 per cent includes the extra long jobs where tubular construction would be absolutely necessary irrespective of cost. In this case an extra large diameter tube may be required to prevent whipping, which would cost more than the solid shaft of normal size of the same length. The solid shaft would, however, whip out at the higher speeds, so that, in general, the statement that money is saved by the use of the hollow shaft is still correct.

Overall Diameter	Wall Thickness
Inches	Inches
1¼	0.120
1½	0.120
1¾	0.134
2	0.134
2¼	0.134
2½	0.134
3	0.156
3½	0.156
3¾	0.188
4	0.219

The material used by this concern in the manufacture of the tubular shafts is S. A. E. No. 1040, and this is regularly specified in connection with the universal joints made by the same concern.

Features of Recent German Airplanes

Effect of Scarcity of Certain Materials on Construction—Three-Ply Coverings Discarded for Single Thickness—Performances of Recent German Machines

SEVERAL months ago an exhibit of enemy airplanes, engines and parts was made in London. It was not open to the general public, but was accessible to airplane designers and other specially interested persons. Some interesting comments regarding German practice in aircraft construction were at the time made in our London contemporary *The Engineer*. We will pass by its remarks regarding German aircraft engines, because they have been dealt with in our columns in such detail that there is little to be added. The following applies to the plane proper:

The writer was particularly interested in discovering in what, if any, direction the enemy was feeling a lack of materials. Whatever straits he may be reduced to in other directions, so far as india-rubber for aero-tires is concerned, he has not yet had to cut his suit according to his cloth, and there is no evidence to show that the "cloth" in question is other than good honest vulcanized caoutchouc. He has, apparently, up to the present had no occasion to test the truth of his own statement, that he can now successfully synthesize rubber.

In at least one other and a more important direction, however, there are unmistakable signs, we think, that our enemy is suffering from a shortage of airplane materials. That he is restricted as to his supplies of suitable wood, that in particular he has now carefully to husband his supplies of ash, is, in our opinion, apparent from the almost callous way in which he is making use of yellow deal and oak. Even such vitally important parts as the main wing spars he is now frequently, almost exclusively, making of deal. This is true of some Halberstadt, Albatross and Aviatik machines that were brought down last spring. In a three-seater Gotha brought down during the same period, the main spar is cut out of a solid piece of ash, but the rear spar is of oak and is spliced at that. An even more significant example of the desire to save ash is to be noted, among other places, in the bottom longerons of the fuselage of an Albatross scout brought down in May. In these, that portion called upon to bear tension is of ash, while the portion under compression is of deal, the two materials being united by means of a glued splice.

Wing Spars of Gotha

The popular belief that the German Gotha is a copy of a certain British machine that through a pilot's error fell intact into the enemy's hands receives some degree of confirmation from an examination of its details, and strikingly so from an examination of its main wing spars. These are of solid ash, and are cut to an I-section, as shown in Fig. 1. The rear spars, Fig. 2, of spliced oak are similarly shaped. This would seem to be a direct departure from standard German practice, for the wing spars of every other machine

shown are of the form illustrated in cross section in Fig. 3; that is to say, they are formed of two trough-shaped pieces glued and tongued together to form a hollow square.

While speaking of the main spars, it may be mentioned that in those of the Halberstadt machine there is a peculiar example of how at times the German will give himself apparently an unnecessary amount of work to secure some trivial end. Where the outer ends of the main spars join on to the flattened steel tubing, now commonly used to give the wing its shape in place, it is customary, as shown in Fig. 4, to leave the spar solid by running the troughing tool out some inches before it reaches the end of the spar. This plan is followed in all the hollow square spars shown, except in the case of the Halberstadt machine. In this the troughing has been carried almost, if not quite, to the extreme end of the spar, while that portion which ordinarily is left solid has afterwards been made substantially so by filling it up with carefully fitted pieces of wood glued into the trough in the manner indicated in Fig. 5. The sectioning here represents the direction in which the grain of the wood is disposed. It is just possible that the very great deal of extra labor incurred in this procedure is regarded as being compensated for by an improvement or fancied improvement in the distribution of the grain.

From other signs, we are inclined to believe that the enemy is suffering from a shortage of three-ply wood. This shortage may not perhaps be wholly attributable to an actual dearth of ash, birch, or white-wood, of which three-ply wood is

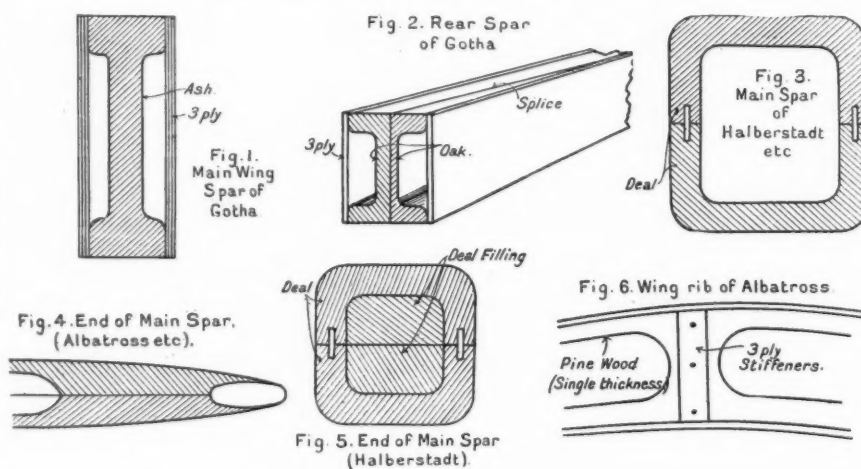
commonly made. In part it may be due to a shortage of the labor required to make it. However this may be, it is the fact that the webs of the wing ribs of a two-seater Albatross brought down last April are made, not of three-ply wood, as is, we suppose, now the universal custom where practicable, but of a single thickness of some unidentified pine wood. The webs between the holes are stiffened by vertical strips of three-ply wood, as shown in Fig. 6.

Captured Machines Tested

When a captured enemy machine of a new type has been restored as nearly as possible to its original form, it is flown by a British pilot to test its capabilities. It thus comes about that we know fairly accurately the capabilities of certain of the chief types of German machines. We may close these notes with a selection from the data thus obtained. The figures recorded below will, we think, prove of considerable interest to those who, while aware that the art has developed to an extraordinary degree, have yet not been hitherto in possession of any accurate figures relating to the performance of recently built machines.

Machine: D.F.W. Aviatik. Engine: Benz 223 horsepower.

Number of crew, 2. Total military load, 545 lb.



Speed at 6500 ft., 96 miles per hour. Revolutions per minute, 1415.

Speed at 10,000 ft., 94½ miles per hour. Revolutions per minute, 1390.

Climb to 6500 ft., 11 minutes. Revolutions per minute, 1340.

Climb to 10,000 ft., 20 minutes 8 seconds. Revolutions per minute, 1330.

Air duration about 3½ hours at full speed at 10,000 ft., including climb to 10,000 ft.

Approximate ceiling, 17,000 ft.

Total weight fully loaded, 3245 lb.

Total military load as follows: Pilot, 180 lbs.; passenger, 180 lb.; Spandau gun and ammunition, 65 lb.; Parabelum gun, 46 lb.; deadweight, 74 lb.; total, 545 lb.

Span, 43 ft., 6 in.; length, 25 ft., 10½ in.; height, 11 ft.

Surface of main planes, 455 sq. ft.

Weight per square foot, 7.1 lb.

Weight—fully loaded—per horsepower, 16.3 lb.

Machine: Fokker. *Engine:* 100 horsepower Gnome.

Made, March 28, 1916. Crew, 1.

Air duration, 2¾ hours.

Speed at 5000 ft., 84 miles per hour. Revolutions per minute, 1140.

Speed at 11,000 ft., 77½ miles per hour. Revolutions per minute, 1120.

Climb to 5000 ft., 8 minutes 30 seconds.

Climb to 10,000 ft., 28 minutes.

Climb to 12,000 ft., 51 minutes.

Machine: Albatross Scout. *Engine:* 160 horsepower Mercedes. Military load, 281 lb.

Speed at 10,000 ft., 98 miles per hour. Revolutions per minute, 1440.

Speed at 15,000 ft., 91.5 miles per hour. Revolutions per minute, 1380.

Climb to 10,000 ft., 16 minutes 10 seconds. Revolutions per minute, 1315.

Climb to 15,000 ft., 41 minutes 10 seconds. Revolutions per minute, 1290.

Air duration, about 2½ hours.

Span, 27 ft., 11 in.; length, 24 ft., 1 in.; height, 8 ft., 9 in.

Surface of main planes, 264 sq. ft.

Weight per square foot, 7.7 lb.; total weight fully loaded, 2044 lb.

Weight per nominal horsepower, 12.8 lb.

Machine: L.V.G. *Engine:* 160 horsepower Benz.

Crew, 2.

Span, 42 ft.; length, 27 ft.; height, 10 ft.

Total weight fully loaded, 2140 lb.

Air duration, 4 hours.

Speed at 9000 ft., 65 miles per hour. Revolutions per minute, 1355.

Speed at 10,250 ft., 60 miles per hour. Revolutions per minute, 1345.

Climb to 5000 ft., 15 minutes 20 seconds. Revolutions per minute, 1360.

Climb to 10,000 ft., 48 minutes. Revolutions per minute, 1330.

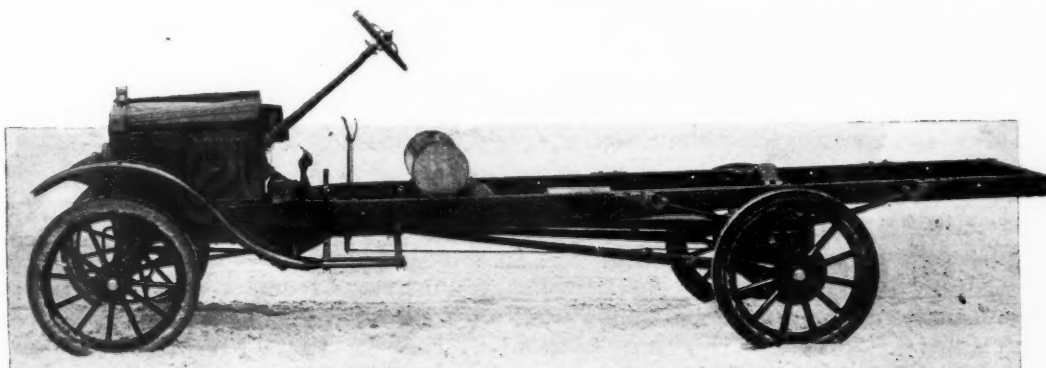
Adapts Ford Truck to Long Body

THE Selden Manufacturing Co. of Detroit, is building a new extension for the Ford 1-ton truck. This extension, known as the Columbia, is built to take care of long bodies and makes the frame long enough to put on a 9-ft. body behind the seat.

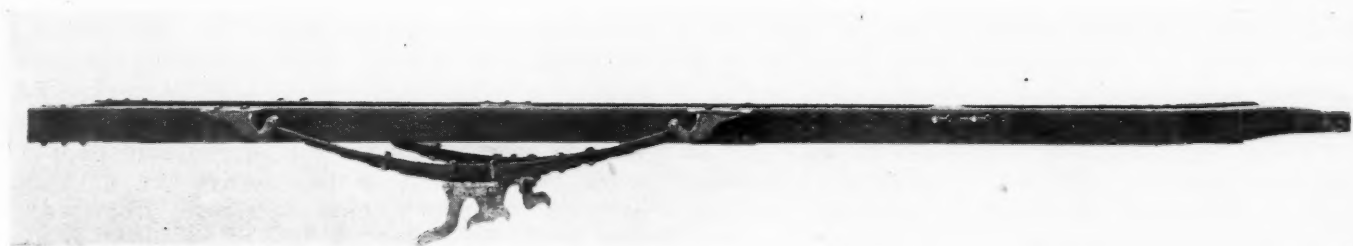
The frame is of solid pressed steel, which is assembled on the Ford truck without any changes being made on the chassis other than those required by the direct assembly of the unit. On this frame are a set of springs and patented brackets, which fit on the Ford rear axle housing flange and encase the Ford spring perch. These brackets can be put on by any ordinary mechanic without drilling any holes or disassembling the Ford wheels. The side springs are high carbon steel and

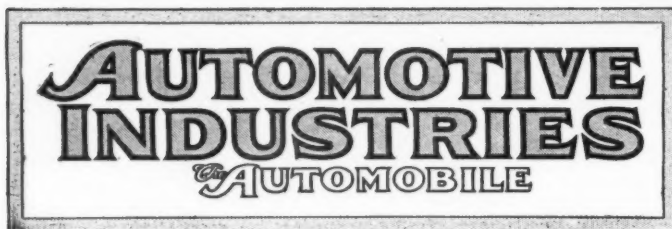
are assembled on the Ford frame to take care of the light load.

By this arrangement the first 1000 lb. rests on the auxiliary spring and the remaining 1500 lb. is taken up by the Ford spring. The Ford spring is built strong enough and is able to take care of 4000 lb. The extension is suitable for grocers and other tradesmen where a roomy truck is wanted. The illustration herewith shows a Ford truck with the attachment assembled on it. The length of the frame over all is 12 ft. 8 in. This frame is strong enough to take care of all types of Form-a-truck bodies and is also long enough without changing any of the sub sills. The illustrations below show the extension and the appearance of the lengthened truck.



On left, Ford truck chassis with extended frame. Below, Columbia frame extension





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Automotive Industries-The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

Bring Back Our Skilled Men

BRING back our skilled men from the cantonments NOW before they get to France. We need them. In spite of all that was said to prevent a like calamity we are traveling the same path our Allies took early in the war. When they discovered their error and realized how important it was for a nation at war to maintain a producing army as well as a fighting army, they immediately called back their men.

Our draft was called selective, but was it? The men then actually engaged on government contracts were exempted. The number of government contracts held by industries at that time was a mite as compared to the present. The major portion of this work is just about to enter into production. Where are the men?

But is the government work the only consideration? Does not the entire industry do its share in supporting the nation?

Production must be maintained in order that our airplane, truck and munition schedule may not be delayed. Without sufficient skilled labor our production is decreased. A trained American mechanic

with a gun in his hand is a more potent enemy to our cause than a German soldier.

Why call men to shoulder guns when those men are so seriously needed at the lathes and benches and their places can very capably be filled by men less valuable to the industry? They should be replaced by the thousands who have since attained the age of 21 and are unskilled, or who are in non-productive lines. Make the draft really selective.

Marine Engine Makers in Tractor Field

DURING the past a great many of the successful manufacturers of tractors have produced their own engines, but it is to be doubted that this practice will continue. We have now arrived in the tractor industry at the stage of quantity production. It is no longer a question with a farmer in looking for a tractor whether a certain machine will or will not work, but which will do the most work for the least money. To be built economically a machine must be turned out in large numbers and if it is to be built complete in one plant an enormous investment must be made in machine tools, jigs, fixtures, patterns, etc. There are at the present time a certain number of financially very powerful concerns engaged in the tractor industry, many of which have grown wealthy in the farm implement industry. But new concerns will find it rather difficult to raise the large amount of capital required to produce tractors from the raw materials in large numbers, especially in view of the drain on capital for war purposes. Therefore everything favors the tendency toward assembling in the tractor industry.

War Depressed Motor Boat Industry

Probably many of the tractor pioneers who built their own engines would have purchased them if they could have found suitable designs. But automobile engines were not designed for the arduous work of tractors and marine engine builders did not seem to rise to occasion and co-operate with the tractor men as long as the motor boat trade was flourishing. The outbreak of the war with its demand for economy and its restrictions on cruising in many waters has somewhat depressed the motor boat industry and marine engine builders are to-day casting about for other fields of profitable activity. At one time it seemed that many of those in position to build comparatively large engines would find employment in connection with the submarine chaser program, but the motor boat type of chaser has been given up.

By reason of their experience marine engine builders are specially fitted to produce tractor engines. Both services are of the heavy-duty kind and the substantial construction found in the best marine engines is what is needed in tractor work. There are, of course, a number of special problems met with in tractor engines not encountered in marine work, such as that of dust separation, the cooling problem and the problem of strong vibration, but

these can be met satisfactorily by any concern having the necessary gas engine experience.

It is therefore not at all surprising to see marine engine builders entering the tractor field. Their experience in a closely similar line should be very valuable and help to advance the tractor industry.

Gas for Testing Airplane Engines

FROM Detroit comes the news that a great deal of city gas is to be used there in running in and testing aircraft engines. Some years ago, when gasoline was getting short and coal was plentiful, this would have been hailed as a step in the right direction, sure to bring relief, but to-day the scarcity in fuel is of a more general character and one has to be familiar with local conditions to be able to say with assurance whether it is more important to save coal or to save gasoline. However, from the standpoint of national economy, it is undoubtedly best to save gasoline. A comparison of prices and heat values tells the story. Good illuminating gas contains about 800,000 B.t.u.'s per 1000 cu. ft., while gasoline contains 115,000 B.t.u.'s per gal. Therefore, with coal gas at 80 cents per 1000 cu. ft. and gasoline at 22 cents per gallon, the cost for a certain amount of thermal energy is about twice as great in the form of gasoline as in the form of coal gas. We are not sure that the prices mentioned obtain in Detroit, but, in any case, they must be pretty close to the actual figures.

Engineering Literature in Wartime

WE have heard it said that this is "an engineers' war," and again that gasoline power plays an important part in the war. The production of all classes of automotive machinery except passenger cars has been enormously increased. Previous to the war, passenger-car manufacture was by far the largest branch of the automotive industries, and since it has shrunk somewhat and all the other branches have expanded there naturally has been a great dislocation of engineering talent. Many of the engineers who were formerly designing or supervising the production of passenger cars are now working on motor trucks, tractors, aircraft engines, etc. This change has confronted them with new problems, which, though somewhat related to those with which they had to deal previously, demand special investigation.

As most of the engineering problems to be solved are new, not only to some of the individuals to whom they are assigned, but in a general sense, there is great need for the co-operation of those institutions in the engineering world which serve as media for the exchange of ideas, namely, the engineering associations and the technical press. The war has brought curtailment in many lines, but we note that in England, for instance, which country has been in the war for nearly four years, the meetings of the

important engineering and scientific societies, such as the Iron and Steel Institute, the Institution of Mechanical Engineers, the British Association for the Advancement of Science, etc., bring out about as many interesting and useful papers as before the war, and there is absolutely no noticeable decline in the contents of the great engineering periodicals. In fact, some of them more directly connected with those industries which are developing unusual activity on account of war demands have even grown perceptibly, and publish more interesting matter than ever before—this in spite of the fact that much of the more advanced engineering work in connection with military equipment cannot be openly discussed.

Similar conditions obtain in this country, and we have no doubt that many engineers, especially among those who have given up their old work for a line somewhat new to them, are scanning their engineering papers for bits of valuable information more closely than ever before.

Aviation Rumors

AVIATION rumors continue to move in a circle. Each week sees a saner view taken of the situation by those who were quick to criticise. It is now being discovered that the engineers in charge of the development of the Liberty engine and the manufacturers responsible for its production are not the only parties to blame in connection with the present 90-day delay. The latest reports from Washington show how certain changes were dictated from Europe.

Recent disclosures also show how it was agreed nearly a year ago that America should aim at producing planes in great quantities rather than developing special fighting types. It was then agreed that America, being 3000 miles from the fighting front, would not be in a good position to develop the latest type of fighting plane which would equal and surpass the latest developments of the enemy.

Both of these factors must be given consideration in carefully weighing criticism launched against those who have had charge of our airplane program. Perhaps it would have been better to have started last summer with the manufacture of certain European types of planes as has been suggested, but it is impossible to state whether such a course would have been the wisest one to pursue until more facts are presented as to how close we are on production with the Liberty design. The resolution passed last week at the Chamber of Commerce of the United States Convention in Chicago urges the government to continue manufacture of existing equipment rather than delaying such while other equipment is being redesigned.

There would have been a serious problem involved in this a year ago if European motors designed for manufacture in European shops, fitted with special equipment, had been decided upon. Our shop practices are different. The mental attitude of our workers is different, and the exact difficulties that would have come about might have resulted in distressing delays which could not but have held back our present production program.

□ Latest News of the

Open Foreign Trade Convention

5th National Gathering Starts in Cincinnati—Automobiles Important Feature of World Trade

CINCINNATI, April 18—The Fifth National Foreign Trade Convention was officially opened here to-day with a representative attendance from all over the United States. The importance of the automobile in the establishment of the United States in world trade was one of the important subjects. John N. Willys, president of Willys-Overland, Inc., Toledo, introduced the topic, and stated:

"Probably nothing in late years has done more to carry forward American export trade than the automobile, which, while possibly considered a peace industry, is just now supplying a very important part in the world war program. Not only has the industry made giant strides in domestic trade, but the aggressive methods of its big men have pioneered the American motor car throughout the world, and in many cases supplied countries with the first American products they have ever seen, thus opening the way for other American goods, because the American motor car has brought credit to American industry in every quarter of the globe."

The convention, which is being held in the Gibson Hotel, will be brought to a close on Saturday, April 20, and has been called primarily to discuss "the part of foreign trade in winning the war." The program covers practically every activity of American industries.

4 Races Sanctioned by A. A. A.

NEW YORK, April 18—The Contest Board of the American Automobile Association has sanctioned several speedway events for 1918. The following schedule has been definitely decided on:

May 16.....	Uniontown
May 30.....	Sheepshead Bay
June 22.....	Chicago
July 4.....	Cincinnati

New York will have a race in the middle of August, and probably another in the fall, and Chicago will have one in September. The dates for these have not been settled.

Innes General Manager of Doble

DETROIT, April 17—Henry L. Innes has been elected vice-president and gen-

eral manager of the Doble-Detroit Steam Motors Co., and will take office on May 15. He recently left his position as factory manager of the Chevrolet plant at Flint, Mich., to become assistant general manager of the General Motors Co. of New York, in active charge of production. He will be in charge of production at the Doble-Detroit plant.

Frank Spiekerman, Greenwich, Conn., and F. R. Humpage, general manager of the Wilt Twist Drill Co., Ltd., of Canada, have been selected as members of the board of directors of the Doble company.

\$1,000,000 for Army Truck Road

ALBANY, April 17—One million dollars has been provided for the maintenance of the main army motor truck road between Buffalo and New York in a bill which has already passed both houses, and is awaiting the signature of Governor Whitman. This extra million dollars will increase the money to be spent for road maintenance in New York during 1918 to \$4,750,000 as compared with \$4,500,000 in 1917.

Salesmanship Congress to Discuss War

DETROIT, April 17—The question of salesmanship technicalities will be of secondary importance at the third annual session of the World's Salesmanship Congress to be held here April 24-27, as the greater part of the time will be spent in considering the status of business during the war.

There will be a talk by J. D. Clarkson on "How Business Can Profitably and Patriotically Carry On During War Times." Herbert Casson, who went to England from America 5 years ago to explain industrial problems to business men there, will speak on "How the United States Can Do It."

Other addresses will be by Norval A. Hawkins, general manager of the Ford Motor Co., on "The Citadels of Cash, Credit and Commerce;" E. LeRoy Peltier on "Practical Patriotism," and Roger Babson on "The Employer's Mistake."

Middle Western Towns Exceed Quota

DETROIT, April 17—Great progress is being made in the Liberty loan drive in the Middle West. Sales in Detroit have passed the \$44,000,000 mark, and Cleveland sales are estimated at \$20,000,000. Akron is \$500,000 ahead of its quota, and in Grand Rapids the manufacturers alone raised \$2,500,000.

Recent factory subscriptions include \$54,000 from employees of the Oakland company, \$487,000 from the Timken-Detroit Axle Co. and \$332,000 from the Cadillac company.

Four States Have Return Loads

Connecticut, New York, New Jersey and Pennsylvania Have 28 Bureaus

WASHINGTON, April 17—Following is a list of return loads bureaus established to date which has been announced by the Highways Transport Committee of the Council of National Defense, which Department is actively engaged in the creation and stimulation of return loads bureaus throughout the country.

Connecticut

Bridgeport.....	Chamber of Commerce
Bristol.....	Chamber of Commerce
Danbury.....	War Bureau or C. of C.
Greenwich.....	War Bureau
Hartford.....	Chamber of Commerce
Manchester.....	War Bureau
Meriden.....	Chamber of Commerce
Middletown.....	War Bureau
New Britain.....	Chamber of Commerce
New Haven.....	War Bureau
New London.....	War Bureau
Norwalk.....	War Bureau
Norwich.....	Chamber of Commerce
Stamford.....	Chamber of Commerce
Waterbury.....	War Bureau

New Jersey

Asbury Park.....	Board of Commissioners
Dover.....	Chamber of Commerce
Garfield.....	Police Station
Jersey City.....	Chamber of Commerce
Newark.....	Motor Truck Club of N. J.
New Brunswick.....	Home Defense League
Trenton.....	Chamber of Commerce
Millville.....	Maurice River Transportation Co.
Mount Clair.....	Police Dept.
Carney.....	State Council of Defense

New York

Buffalo.....	Chamber of Commerce
New York.....	Merchants Association

Pennsylvania

Philadelphia.....	Chamber of Commerce
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Attention of War Board to Tin

WASHINGTON, April 16—The War Industries Board yesterday in conference with 30 manufacturers discussed the tin supply. This marks the beginning of sessions which will probably result in international price-fixing of tin which has doubled in value since the beginning of the war, and in priority for certain users of tin.

The Shipping Board requires a considerable amount and will probably have first priority. Tin is now being imported to America from Batavia, American West Indies, Dutch East Indies, Strait Settlements and China. The only deposits in the United States are in California and North Carolina, and are but little developed. There is said to be an unlimited supply in Alaska, which has not yet been developed.

Automotive Industries □

Co-ordinate Truck, Motorcycle and Car Buying

Order Pooling Procurement and Maintenance of Military Vehicles Signed—New Board Formed to Handle the Work

WASHINGTON, April 17—Purchase, procurement and maintenance of military trucks, motorcycles and passenger cars in this country are now co-ordinated.

An order combining a special order pooling all the truck, motorcycle and passenger car activities and a general order with instructions for contracts was signed yesterday by the Chief of the General Staff.

The order places the control of this section of military work under a board comprised chiefly of Quartermaster officials with representatives from the other army division. The Ordnance Department retains full control of tanks and military tractors.

Purchasing details in the future will, therefore, be supervised by the new board under final direction of the Automotive Products Section of the War Industries Board headed by H. L. Horning. A board is also to be named in the near future to sit with Mr. Horning which will be composed of a representative of the Army and the Navy relative to all truck, passenger car and motorcycle contracts.

Mr. Horning's division has nothing to do with procurement and maintenance, which will be directly under the new board named by the General Staff in yesterday's order.

Activities Pooled Abroad

General Pershing realized quickly several months ago the need for pooling the motor activities in the army abroad, and so arranged the organization. The need for a co-ordinated motor division on this side has been even more important. Up to this time the various motors activities have been so widely separated that there have been as many as 30 Government purchasing agents buying the same materials, competing with one another on price and for raw materials and for priority.

In addition there has been a great confusion in production and in maintenance. There have been innumerable corps devoted to maintenance of a few trucks in each instance where with the co-ordination many less men will suffice to maintain far greater numbers of trucks.

There have been hundreds of inspectors in the same cities while under the new co-ordination a few inspectors will be able to look after the same work that formerly required the greater numbers.

In fact, there has been every reason for co-ordination with no good reason for the continuance of the present system.

Durant Calls Fuel Meeting

WASHINGTON, April 17—W. C. Durant, President of the General Motors Corp., has called a meeting of the Fuel Committee of the National Automobile Chamber of Commerce for April 29, to be held in New York City. Further curtailment of the fuel allowance to the manufacturers will be discussed. Following this meeting and the arrival at a final decision Mr. Durant and the committee will meet between May 10 and 15 in Washington to confer with members of the War Industries Board on this matter.

Engineers Going To France

WASHINGTON, April 17—Six prominent members of the automotive industries have been asked and have accepted the invitation to go to France for an extended period as civilians in charge of the various important details of motor truck maintenance. Their names cannot be given out because of objection by the War Department. These men will individually supervise the building of repair depots, installation of machinery and the handling of repairs and assemblies, each taking separate part of the work under its control.

New York Jobbers Organize

ROCHESTER, N. Y., April 19—The jobbers of New York state formed the New York State Association of Automobile Accessory Jobbers at a meeting held here April 10. It is an adjunct of the National Association of Automobile Accessory Jobbers, whose field secretary, George Fritz, assisted in forming the new unit.

The state organization will handle local problems much as the national body handles national matters. The officers are:

President, C. S. Owen, Chapin-Owen Co., Rochester; secretary, E. T. Ball, Joseph Strauss & Son, Buffalo; treasurer, W. J. Davis, Davis-Brown Electric Co., Ithaca. The president named an executive committee, consisting of the officers and H. J. Rowerdink, W. H. Rowerdink & Son, Rochester; W. E. Foskett,

Albany Hardware & Iron Co., Albany; Harrie R. Williams, A. J. Picard & Co., New York; R. Bundy, U. S. Rubber Co., Syracuse.

In addition to the companies already named those represented were: H. D. Taylor Co., Buffalo; U. S. Rubber Co., Buffalo; U. S. Rubber Co., Rochester; S. B. Roby Co., Rochester; Lee Auto Supply Co., Syracuse; Barker, Rose & Clinton, Elmira; Motor Car Equipment Co., New York; H. A. McRae & Co., Glens Falls; Farrell Auto Supply Co., Brooklyn. The next meeting will be held at the Hotel Ten Eyck, Albany, at 2 p. m., May. 15.

Spruce Lumber Prices Set

WASHINGTON, April 16—Prices the government will pay for spruce lumber were agreed on at a conference between the War Industries Board and representatives of the spruce industry. Price on random lengths will range from \$35 to \$48 a thousand, and on lengths from 8 to 20 ft., from \$40 to \$55, according to size. For every 2 ft. over 20 ft. in length an additional charge of \$1 a thousand will be made. These prices will remain in effect until July 1.

May Curtail Rubber Imports

WASHINGTON, April 18—The Shipping Board has called a meeting of importance of rubber including the tire manufactures for to-day at which they will discuss the possibilities of curtailing the tonnage now devoted to the importation of rubber. Nothing definite will be decided at this meeting which is more or less of a round table conference. Following this meeting the Shipping Board will take up the results with the War Industries Board after which a definite decision will be announced.

U. S. Tire Sales \$55,000,000

NEW YORK, April 18—Tire sales of the United States Rubber Co. during 1917 amounted to more than \$55,000,000 as compared with slightly less than \$40,000,000 in 1916. The company estimates that more than \$70,000,000 worth of tires will be sold in 1918, and that eventually, tires worth \$20,000,000 will be made yearly in the recently acquired plant at Providence, R. I.

For the first three months of 1918, the United States Rubber Co. showed a gain of 40 per cent in sales over the corresponding period of 1917. This gain, according to officials of the company, was well distributed over all departments.

Total sales of the U. S. Rubber Co. in 1917 amounted to \$176,159,694, of which \$31,243,053 was operating profit, and \$15,340,577 surplus applicable to dividends.

Shortage of Cars in Australia

Transportation Difficulties Tie Up Money and Prevent Importation of All Motor Vehicles

NEW YORK, April 17—Australia is not able to get enough automobiles at present because of the shortage of shipping facilities. The sale of automobiles in Australia is further restricted by the fact that there are more than 3,000,000 tons of wheat awaiting shipment from Australia to European points, and as a result of transportation troubles, considerable money throughout the country is tied up. Although the majority of the wheat has been purchased by the British government, the bulk of the 1916 and 1917 wheat crops has not yet been shipped from Australia.

In spite of this situation Peter McIntosh, head of the firm of McIntosh & Sons, Ltd., Sydney, Australia, who is visiting America on one of his regular investigating trips, reports that nearly every automobile is sold months before it reaches Australia, and that there is a real shortage of cars. In spite of the war Australia is enjoying good times. There was a fair wheat crop in 1916 and a good crop in 1917. The 1918 crop is being sown at the present time and will not be harvested until next November or December.

Money Brought In

Wool has been selling as high as \$1 a pound. This has brought huge quantities of money into the country, as practically all of the wool has been shipped.

The manufacture of automobile bodies in Australia is developing due to the Australian government regulations last fall preventing the importation of bodies on chassis. However, it will be from 3 to 6 months before the body builders will be able to meet requirements. When the government issued its first regulations restricting imports of bodies, the body manufacturers were not prepared to produce the necessary quantity, and the government has had to modify the ruling constantly to give the Australian body builders an opportunity to get material and machinery, as well as a chance to get organized for production. As a result of this ruling, several Australian concerns which previously built railroad cars are now building automobile bodies. Large importers, such as McIntosh & Sons, Ltd., have developed body building departments and have standardized designs so that production will soon be at the rate of 20 a week. There is still a shortage of material for bodies and also of machinery for manufacture.

The straight-side tire situation is rather acute in Australia and Mr. McIntosh thinks it would be an error for any American tire manufacturer to attempt to insist on selling only straight-side

tires in Australia. The reason is that the three large tire makers in Australia, as well as several smaller ones, together employ a total of 4000 workers, are fitted to manufacture clincher types only, and any effort on the part of American manufacturers to restrict the Australian tire trade to straight-side types would unquestionably result in the Australian government prohibiting the import of straight-side tires. Australian makers have not the moulds for straight-side manufacture and there are not sufficient shipping facilities to import these moulds. As a result the Australian tire makers will have to continue to manufacture the clincher bead tire.

Demand for Magnetos

There is an increasing demand in the interior portions of Australia for magneto equipment only on automobiles. In these sections of the country there are no facilities for battery care and scarcely an opportunity for purchasing distilled water. There are possibilities for opening an extensive automobile selling field in these interior sections with the car having magneto equipment, according to Mr. McIntosh.

In all parts of Australia the 56-in. tread is satisfactory.

Gasoline is at present selling at 70 cents per Imperial gallon throughout the country.

There is very little possibility of the Australian government taking any action that might classify the automobile as a luxury. The automobile interests during the last year have had this subject up with the government, and by a country-wide investigation it was demonstrated that 84 per cent of the cars in the commonwealth are used for business and professional purposes, so that only 16 per cent could be classed as luxuries.

Practically all large motor car business on the continent has ceased.

At present there is not a strong market for motor trucks in Australia. Dealers cannot obtain the necessary quota of cars at best, and are not anxious to add to their difficulties by taking on motor trucks, which are more difficult to sell. Until shipping facilities improve, and greater quantities of cars can be imported, it will be difficult to sell either motor trucks or farm tractors.

To Discuss Further Fuel Curtailment

WASHINGTON, April 16—It was definitely decided at a meeting in New York to hold the fuel conference between the automobile manufacturers and George N. Peak, Frank B. Noyes and C. R. Replogle of the War Industries Board here on April 29. At this meeting further curtailment of fuel for the industry for 1918-1919 will be discussed. Also all materials, including lumber, leather, steel, coal, etc., will be taken into consideration. At the same time the Government officials will be urged to take heed of the large, efficient factory organization which will be disrupted if another serious cut in the curtailment of the industry is effected.

Wants Definite Road Policy

New York Highway Traffic Assn. Asks Federal Government to Centralize Control

NEW YORK, April 17—Resolutions calling upon the President and Federal Congress to adopt some definite road building policy and provide for some centralized control for the determination, construction and maintenance of highways throughout the United States, and for the use of prisoners of war in road construction work, were unanimously adopted at the meeting of the Highway Traffic Association of the State of New York here last night. The broad aspect of road construction in the United States was outlined by the speaker of the evening, S. M. Williams, president of the Highways Industries Association, whose headquarters are in Washington.

Mr. Williams said that it was his opinion that the economic necessity for improved highway transportation was of greater importance than the immediate military needs and that the further shipment of our troops abroad will make it necessary for great quantities of goods to be transported to the eastern seaboard. As the result of this increased shipment of food, clothing and the other necessities of life, transportation congestion will be greater this year than it was during the acute period of last winter. Mr. Williams also made a plea for the use of prison labor on the roads, provided this work be carried on under the honor system instead of armed guards and chained balls.

The necessity for the construction of a vehicular tunnel connecting the lower end of Manhattan Island with the important freight terminals in Jersey City was also outlined by the chairman and counsel of the New York State Commission created to confer on the matter with a similar commission from the State of New Jersey. It was pointed out the serious coal shortage in New York City last winter would have been averted if such a tunnel had been constructed, and that the cost of it would have been more than saved in the reduction in the cost of getting coal into the city by lighters and tug boats. The tunnel is estimated to cost approximately \$12,000,000, and there is a possibility of the Federal Government paying one-third of the cost of construction, thus leaving about \$4,000,000 to be paid by each of the States of New York and New Jersey.

Screw Products Factory Going Up

CLEVELAND, April 15—The Automobile Screw Products Co. is erecting a factory building opposite the Abbott plant. The company has also bought a lot 100 x 300 to provide for future expansion.

Resolutions

Agreed Upon by the Chamber of Commerce of the United States

THE following expressions of opinion on over a score of questions of national importance indicate the thought of business America on these various national problems in relation to war conditions. These resolutions were agreed upon by practically all of the Chambers of Commerce represented at the Chicago convention:

1. *Punish Spies.*—All branches of the United States Government are urged by tireless vigilance, rigorous enforcement, relentless pursuit and prosecution to impose severe penalties and prompt punishment on all persons found guilty of destroying munitions and other property or hampering the nation's forces for winning the war.

2. *Universal Military Training.*—Universal military training is essential to the adequate progress and security of the nation in times of peace and is imperative at such serious periods as the present.

3. *Third Liberty Loan.*—All business men should continue to work untiringly in selling the Third Liberty Loan, as well as subsequent issues.

4. *War Savings Stamps.*—Business men should take a personal interest in the forming of local savings clubs and doing all such other things to encourage participation in these stamps.

5. *Shipbuilding.*—That business men in all parts of the country should lend their efforts and make private interests secondary to this major problem of shipbuilding, so that local shipyards shall have first call upon the best labor and executive ability available; and that local business organizations unite for definite assistance to the shipbuilder or producer of ship parts.

6. *War Funds.*—In order to prevent fraud and duplication of effort, business-like methods should be adopted in all communities for raising funds for legitimate war reliefs and agencies.

7. *Concrete Ships.*—Congress is urged to approve the \$50,000,000 appropriation for the immediate construction of concrete ships.

8. *Sherman and Clayton Acts.*—As the principles of economic construction are apparently in conflict with the Sherman and Clayton acts, and as it has been necessary to adopt an economic policy in regard to the conduct of the war, it is requested that a special committee be appointed to prepare a referendum on this subject, and request Congress to examine promptly the whole situation from the national and international standpoints; and to either amend promptly or replace the existing laws with clear, reasonable and adequate new legislation.

9. *Government Control.*—We urge Congress and the various departments of the Government to give close scrutiny and examination to all measures or proposals which have for their object the control of industries; and that such proposals be adopted only where there is sufficient evidence indicating that the state of war makes such control more effective for the proper conduct of the war.

10. *New Industries.*—That the War Industries Board will discourage all new industries not essential to and contributing either directly or indirectly toward winning the war, and which industries involve labor, material and capital required in war pursuits, and that the War Industries Board give notice that it will withhold from such projects priority assistance.

11. *Post War Merchandise.*—The War Industries

Board should deprecate and discourage the manufacture of materials, equipment and supplies for export for which export licenses will not be issued during the war, thereby conserving materials, labor and capital for war necessities.

12. *Essential Industries.*—That the War Industries Board, or such other governmental body as is authorized to do so, declare what industries are essential for the conduct of the war as rapidly as they feel justified in making such declarations.

13. *Taxation Payments.*—Favors the payment of income, excess profits, and other war taxes in installments.

14. *Price Control.*—That Congress with the least possible delay enact legislation which will grant authority for the control of prices in every line where war needs and public interests require it.

15. *Centralized Control.*—Favors the centralization of control and responsibility of as many war activities and functions as can be accomplished.

16. *Price Fixing.*—Appoint a permanent committee to study conditions relating to the law of supply and demand and provide a formula upon which costs and investments may be ascertained, and reasonable prices fixed.

17. *War Design.*—That any article required by the Government for war purposes which has demonstrated satisfactorily to the Government, be manufactured until the production of an improved design has been completed. The Government should not delay production of existing designs pending the development of new designs.

18. *Fire Insurance.*—As the question of fire insurance has greatly increased, due to the war, that a special committee to study the whole subject be appointed.

19. *Railroad Terminals.*—That railroad terminals in large cities be placed under the supervision and control of a single competent individual; and that, as railroad equipment is declining, that the utmost promptness should be used in placing orders for locomotives and cars in sufficient quantities to give sufficient transportation. Standardization in railroad equipment is secondary in importance to securing as quickly as possible the necessary equipment.

20. *Railroad Conference.*—That a conference representative of the financial, industrial, commercial, agricultural, civil and social interests of the nation, and which are affected by transportation, be called to consider the broad aspects of transportation problems and to formulate a basis for the control and operation of transportation facilities.

21. *Waterways.*—That as present transportation traffic is beyond the capacity of the railroads the President and the Director General of Railroads be petitioned to complete trunk highways for heavy vehicular traffic where they can be useful in relieving railroad congestion; and to develop inland and coastwise waterways.

Chamber of Commerce Delegates Urge Better Roads

3000 at Convention Recommend That President Take Steps to Improve Trunk Highways

CHICAGO, April 12—Transportation proved the most important subject that was considered by the 3000 delegates who attended the annual convention of the United States Chamber of Commerce, held here this week. These delegates recognized that the railroads of the country are not capable of caring for the increased transportation needed because of the war. Due to this, they recommended that the President take steps to improve trunk highways so that motor vehicles can by use of these highways relieve the railroads of a portion of the traffic load.

The delegates also realizing that our canal system and waterway system in general have practically fallen into disuse, urged that steps be taken to invigorate them as needed.

The delegates voted for the greatest speed in placing orders for railroad locomotives and railroad equipment so as to keep our transportation facilities up to some standard where they should be and recommended that any standardization program for railroad construction should not be introduced if it would in any wise hold back the production of locomotives or cars.

Link All Highways

The resolution favoring the coupling up of trunk highways for motor vehicle traffic doubtless came as a result of the part played by automobile interests in the convention. Roy D. Chapin, Chairman of the Highways Transport Committee of the Council of National Defense, told the convention of the necessity for linking up trunk lines which are to-day not linked up between states as they should be. F. A. Seiberling, President of the Goodyear Tire & Rubber Co., participated in the special session which was given over entirely to highway transportation.

This session on transportation was divided into two sections. One was devoted chiefly to the railroad situation, under the leadership of Harry A. Wheeler, chairman of the committee on railroads of the Chamber of Commerce, and consisted of papers by Alba G. Johnson, president of the Baldwin Locomotive Works, on Motive Power; John F. Wallace, chairman of the Chicago Railway Terminal Commission, on Terminals; and by Samuel O. Dunn, editor *Railway Age*, on Car Supply, as well as a talk entitled Extensions, by Francis H. Sisson, vice-president of the Guaranty Trust Co., New York. It was as a result of the discussion of these, and particularly Mr.

Sisson's paper, showing the need of greater inter-relation between our three main transport facilities, the railroad, the waterways and the highways, that the resolution on that subject was made.

Highway transportation, in itself, had a special session, under the leadership of Mr. Seiberling, and it was addressed by Mr. Chapin, A. C. Bedford, president of the Standard Oil Co. of New Jersey, and chairman of the Petroleum War Service Committee, and Secretary Shirley, of the Highways Industries Association, formerly State Highway Engineer of Maryland.

Use Gasoline Carefully

Aside from the resolution advocating a central control of highway policy, the biggest outcome of that meeting was the suggestion by Mr. Bedford that while the production of gasoline so far has been sufficient for all needs, that it might be possible, through government action, to limit the supply of motor fuels for passenger car use. He did not say that in so many words, but his attitude seems to have changed somewhat from that of a few weeks ago when he publicly announced that there was no prospect of any necessity of limiting the supply of motor fuel. His statement yesterday was couched in these terms:

"I am hopeful that there will be sufficient gasoline available to provide for all commercial as well as passenger vehicles in operation during 1918. Even should there be a shortage of gasoline, the development of the motor truck should not be retarded, even though it should become necessary to place restrictions on the use of gasoline by passenger vehicles for pleasure purposes.

Automobiles Are Necessities

"I must again earnestly urge upon every consumer of gasoline the imperative necessity of conservation. When in July of last year I issued a statement upon behalf of the Council of National Defense, I said 'People should look upon their automobiles as necessities to be used only when needed. Not a gallon of gasoline should be used in the present emergency except for some useful thing.'

"Gentlemen, the warning is more than ever necessary now. The conservation of gasoline may no longer be a matter of choice. It may become necessary to set down definite and drastic regulations to restrict needless consumption of such essential products."

In opening the meeting on Highway

transportation, Chairman Seiberling recalled that for a number of years the tonnage carried over our railroads had doubled each decade, while the additional mileage had decreased.

Recently, a new piece of transportation machinery has been introduced and the motor truck sounds the death knell of short line railroads, because it provides its own terminal facilities, a feature which J. J. Hill has said was the greatest need of the railroad. The motor truck takes the freight at the point of origin, and delivers it at the door of the consignee. Hard-surfaced highways capable of carrying the new burden by motor trucks which the railways cannot handle are a necessity. Of our 2,500,000 miles of highways, only 10 per cent have been improved, and not all of that improved is capable of carrying truck chassis all the year round. We are coming to a period of highways with permanent surface, wider track and open to traffic 365 days in the year.

There are 400,000 motor trucks in service in the country to-day. By the end of the war, we will have 4,000,000 in service. The postal department shows a deficit of \$3,000,000 in its parcel post. Through the rapid introduction of motor post, this deficit will be converted into a profit, when well-surfaced highways have been extended. In good time, our great task on the other side will be completed, and we must think of activity after the war, and plan for a sound, safe program of highway development.

Mr. Chapin told of the governmental recognition of the fact that the highways must play their part through the establishment of the Highways Transport Committee of the Council of National Defense, outlined the systems of inter-city motor transports in this country and in England and of its rapid recent development, of the return loads bureau, of the methods of handling freight terminal congestion by motor truck, etc.

2 More States Buy Tractors

DETROIT, April 17—The Commonwealths of Kentucky and Massachusetts have each ordered 100 Ford tractors to be distributed to the farmers. It is understood that these are both trial orders, and may lead to larger demands.

The plan of distribution in both states is the same as that adopted by Michigan, as described in the April 4 issue of *AUTOMOTIVE INDUSTRIES*. They will be sold direct to farmers who sign an agreement to use the tractor efficiently and lend it to others at a reasonable charge.

Germany's Monopoly Policies

Government Insists on Monopolies as Necessary to Meet War Demands—Industries Must Pool Under the German Cartel System—Airplanes and Automobiles Included in Monopoly Program

By CHAUNCY DEPEW SNOW*

THERE are two outstanding features of the organization of German commerce as developed during the war and as proposed for the period after the war. One of these is the great concentration of business, in banking as in manufacturing and merchandising. The other is the probability of the formation of a large number of Government monopolies in Germany.

The German cartel system—the system of big pools of manufacturing concerns chiefly those engaged in what are known in Germany as the heavy industries, iron, coal, chemicals, cement, sugar, alcohol, etc.—has been much talked of in this country during the war period. The cartel idea runs all through the German industry so far as the manufacture and sale of the more standardized products are concerned. The cartels were originally formed for the control by agreements of prices, the adoption of uniform price lists, the limitation of production and determination of the distribution of output. As concentration had increased in some of the more important cartels or syndicates common sales departments for entire cartels had come into being, and in some cases there were common centralized purchasing departments. The cartels worked up funds for offensive and defensive purposes. The stronger cartels, particularly those chiefly interested in large-scale exportation, early adopted definite cartel policies for export.

War-Time Concentration

In war time the concentration of individual concerns in cartels and the concentration of the individual cartels into bigger cartels or syndicates proceeded with much more impetus than in ordinary times. A new phenomenon appeared, in the formation of the so-called compulsory syndicates or compulsory cartels. The government had entire control over all the industries that had particular war significance. This included not only the industries that were working on war orders, but all the other industries that made heavy demands on coal and transportation. The government early in the war—after it became apparent that the German expectation of a quick and complete victory could not be realized, took the steps that were deemed necessary to economize in coal, transportation, raw materials and labor. One form of accomplishing all these ends was to close up factories in particular industries and concentrate the production in such factories and such centers as were economical. In some cases it was reported that all

the factories in a given town would be closed up under such an order. If the machinery could be used to better advantage elsewhere, the machinery was transferred where it was most needed. The work people who were in demand for various kinds of work were steered by the officials to the places where their services were most needed. The industries working on war goods were, of course, even more closely under the domination of the military authorities than the others. The manufacturers in the different military districts soon became accustomed to have their prices for their products fixed by the commanding generals, with fines and imprisonment for any breach of orders. The government itself formed certain big government companies, such as the War Grain Co., to control the grain trade, which thus became a government monopoly, and the many raw materials companies working under the War Ministry.

Leather Industry Opposed Syndication

Naturally, the compulsory syndication of the various industries was not carried through without vigorous protest. The industries which had been particularly free from syndication in the past had been without syndication for some good reasons and voiced those reasons as strongly as possible when the Ministry of the Interior and the military commanders instructed them to form syndicates. One conspicuous example of this was in the leather industry, where twenty-nine manufacturers united to oppose syndication. The government granted a postponement of the date of syndication, but gave no acknowledgment as to the permanent abandonment of the idea with reference to the leather industry. Apparently the first industry which was concentrated in a compulsory syndicate was the boot and shoe manufacturing industry. By government orders there had been both in 1915 and in 1916 considerable concentration of particular industries, but not in the definite form of syndicates. The boot and shoe syndicate is under Imperial control, and a representative of the Imperial Chancellor attends its meetings. Hundreds of factories were closed under the authority of the advisory committee, which may requisition for a syndicate company the plant, materials, and finished goods of any manufacturer. Provision is made for an equalization fund to recompense in part the companies whose plants are closed or dismantled. Under the central authority of the advisory committee there appeared a number of big syndicate companies, each with a given area determined by the Chancellor.

Following the syndication of manufacturing of boots and shoes came the syndication of the trade in boots and shoes, the retail dealers being compulsorily formed into big distribution companies, and it was only these big companies that could distribute. In 1918 it was reported that the government was contemplating still further concentration of the shoe trade by which three-fourths of all the shoe stores in the country would be closed. In peace times it was said that there were 35,000 dealers. Under the rationing system which is a part of the compulsory syndication, the retailers receive quotas based on their normal turnover. The result was that the small dealers could not make any pretense of keeping up full assortments either of styles or sizes. A customer would have to go the rounds of all the shoe stores in a town possibly before finding a pair of his size.

In view of the shortage of fats, the compulsory syndication of the soap industry was, as might be expected, carried out early in the 1917 period of compulsory syndication. In August, 1917, the state governments were authorized to combine the graphite mines and works into compulsory syndicates.

The silk syndicate was formed in August, 1917, at the invitation of the government. There was a tendency to protest at first, but when the government intimated that compulsion would follow, the invitation was speedily accepted. Many new syndicates were formed in the textile industries. There was concentration of the glass industry, likewise under government auspices.

Many Syndicates Prolong Agreements

A great many of the old syndicates prolonged their syndicate agreements. The zinc syndicate and the North German car works union, the old lignite syndicate, the Rhine-Westphalian coal syndicate, and the great steel syndicate were renewed and extended. There were many syndicates which were prolonged which probably would not have continued if it had not been for the war and government duress.

The syndication movement, in order to effect economies contributing to German successes in war, has been characteristic of many local industries and lines of trade which in normal times would not have resorted to syndicate organization. Much of this syndication, particularly in purely local matters, may be regarded as simply a matter of war expediency, and not something that will continue into the future.

For years there had been great concentration of banking in Germany, in the hands or under the control of about half a dozen great banks. Each of the big banks headed a group of other banks and a big group of industrial operations at home and abroad. The movement of concentration in banking has kept up steadily during the war, and the German great banks have become even greater. By absorbing provincial banks the

(Continued on page 799)

*Editor's Note.—Paper read before the Fifth National Foreign Trade Convention, Cincinnati, April 18-20.

Increase Production of Castor Beans

U. S. to Grow 200,000 Acres in 1918—Product Now Being Imported from India

WASHINGTON, April 16—The United States is probably the world's second largest producer of castor oil, the demand for which has so unexpectedly increased. Prior to the war, production of castor oil in the United States was more than \$1,000,000 a year in value.

Much of the output from the factories was produced from castor beans imported from India, the chief source of the product. Formerly the United States produced considerable quantities of castor beans, but when the development of the petroleum industry produced a cheaper and more satisfactory lubricating oil, castor bean production decreased.

The minority report of the Senate Military Affairs Committee states that there were not enough beans in this country last summer to make anywhere near the amount of oil required for airplane lubrication, nor enough seed to grow the quantity of beans needed. The Signal Corps, after great difficulty, managed to obtain a shipload from India, and made a contract for having 11,000 acres planted from these seeds.

Imports of castor beans into the United States follow:

Year	Amount in bu.
1913	844,000
1916	1,035,000
1917	1,041,000

No figures are available as to the total production of castor beans in India, China, Indo-China, Java, South Africa, the United States and Brazil also rank high in castor bean production.

In the United States the Department of Agriculture and the War Department are combining to stimulate production. The goal set is 200,000 acres of the bean in 1918, and contracts have been made with individuals for castor beans at \$3.50 a bushel, permitting them to guarantee the growers or sub-contractors \$3 a bushel, f.o.b., at the nearest local weighing and forwarding center.

Tractor Demonstrations for Georgia

ALBANY, GA., April 16—The first of the tractor demonstrations being arranged by the State Council of Defense of Georgia will be held here on May 7 and 8. The first day will be devoted to plowing, with a demonstration of night work with searchlights, and the second day to the preparation of the seed.

It has been planned to give a similar demonstration in each of the Congressional districts of the state.

Mexico to Buy Tractors for Farmers

MEXICO CITY, MEXICO, April 12—For the purpose of buying a large number of farm tractors and other agri-

cultural machinery and implements for the Mexican government, Pastor Roaix, Secretary of Agriculture, will visit the United States shortly. The government will sell these to farmers on long-time payments, as a means of introducing more progressive agricultural methods. Before making the purchase Mr. Roaix will inspect Texas and Middle Western farms on which tractors are used.

General Electric to Enter Bijur

NEW YORK, April 15—It now appears certain that the reorganization of the Bijur Motor Lighting Co., Hoboken, and the entry of General Electric interests into the company will be effected. The Bijur company was placed in the hands of a receiver last January. The creditors' committee has been looking toward a reorganization or a liquidation of the affairs of the company. Liquidation was made impossible by the fact that the government had requisitioned the Hoboken building and that it required starters, made under Bijur patents, for airplanes and motor trucks now building. The General Electric Co. has proposed to take over the management, control and assets of the Bijur company, either through acquiring stock in the company or forming a new company, and will contribute at once as working capital \$300,000 cash and \$200,000 additional as required. Creditors will receive notes of the Bijur company, or its successor, for the full amount of their claims, the notes to bear interest at seven per cent and run for ten years. Of these notes \$50,000 will be retired each year.

Collier Truck Price Increased

BELLEVUE, OHIO, April 15—The Collier Motor Truck Co. has increased the price of its Model M, ¾-ton truck, \$100. The new price for the truck, complete with body and electric starting and lighting system, is \$985, and the chassis price \$935.

Studebaker Adds \$100 to Cars

DETROIT, April 15—The Studebaker Corp. increased the factory prices of its models to-day as follows:

Model	New Price	Old Price	Increase
4-cylinder			
Touring	\$995	\$895	\$100
6-cylinder			
Light touring....	\$1,395	\$1,295	\$100
Big Six touring..	1,795	1,695	100
4-pass. roadster.	1,550	1,450	100
Chassis	1,295	1,200	95

Oldsmobile Price Increase Scheduled

NEW YORK, April 15—The Olds Motor Works, Lansing, will on May 1 increase the price of its 8-cylinder open models. The present price is \$1,495; this will be increased to \$1,550. Prices of 6-cylinder models probably will remain unchanged, the open models listing at \$1,195, the coupe at \$1,595 and the sedan at \$1,695.

Arrange Parcel Post Truck Routes

Two Will Be Started on May 1—Will Go from Washington to Virginia Farms

WASHINGTON, April 16—On May 1 two parcel post motor truck routes will be inaugurated by the Post Office Department between Virginia and the capital. The innovation of these routes will be watched closely by Washington officials, as they are to form the experimental basis for considerable enlargement of the plan with regard to the establishment of other routes in co-operation with the Food Administration.

The first two routes are expected to bring the Washington produce consumers in contact with Virginia farmers. One will be from Washington to White's Ferry and the other from Washington to Middleburg, each including all important centers and farms in the districts.

The trucks will leave Washington at 11 o'clock every morning, reach their destination at 2:30 in the afternoon of the same day, and start on the return trips one hour after arrival. This will allow Washington householders to send orders to Virginia farmers by morning mail and receive the desired food fresh the evening of the same day.

B. R. Wilson, District of Columbia food administrator, is trying to devise some means of insuring the farmer prompt payment for his produce and insuring the consumers fresh produce. This can be accomplished by establishment of a reference bureau to serve as a clearing house for farmers and consumers.

Wood Wheels for War Trucks Ordered

WASHINGTON, April 13—Awards were placed on March 30 by the Quartermaster Department as follows:

Schwarz Weill Co., Philadelphia, Pa., wood wheels.

Prudden Wheel Co., Lansing, Mich., wood wheels.

Bimel Spoke & Auto Wheel Co., Portland, Ind., wood wheels.

These orders are in connection with the standardized war trucks.

Wright Aeroplane Buys Another Plant

DAYTON, OHIO, April 16—The Wright Aeroplane Co. has purchased the plant of the Union City Body Works, at Winchester, Ind. It will be used for the manufacture of airplane parts, and about 250 men will be employed there.

S. A. E. to Discuss Tractors

NEW YORK, April 11—At its next monthly meeting the Metropolitan Section of the Society of Automotive Engineers will discuss track-laying types of tractors, and papers on the subject will

be presented by Messrs. Tewksbury of Cleveland and Kennedy of New York. The meeting will be held at the Automobile Club of America Building on the evening of April 24.

Find 5-Ton Truck With 5-Ton Engine Is More Economical

AKRON, OHIO, April 16—The Goodyear Tire & Rubber Co. has compiled statistics as to gasoline and oil consumption and average speed of its fleet of trucks.

The six Goodyear 5-ton trucks, with regular engines, have averaged 10 m.p.h., running time, for the 740-mile trip between Akron and Goodyear, Conn. The 3-ton Packard truck, equipped with a 5-ton engine, averaged 14.9 m.p.h. actual running time on the route. The total elapsed time of the trip during which this speed was maintained was 77 hours, giving an average speed of 9.6 m.p.h.

The 3-ton truck with a 5-ton engine consumed a gallon of gasoline for every 5 miles on 3 trips to Detroit and 2 trips to Boston, giving a total distance of 1990 miles. The ordinary 5-ton White and Packard trucks used averaged 3½ miles to the gallon, and the 3½-ton Mack truck 3 miles to the gallon.

In oil consumption also the 3-ton truck with the 5-ton engine is ahead of the others, having averaged so far 110 miles to the gallon as compared with their 50 miles to the gallon.

Liberty Engine Flies 325 Miles

NEW YORK, April 16—An army airplane equipped with a Liberty engine flew from Langley Field, near Norfolk, Va., to Mineola, L. I., a distance of 325 miles, in 3 hr. and 15 min. yesterday. The engine, which is one of those made by the Packard Motor Car Co., is said to have worked faultlessly during the entire trip.

4255 Cars in the Philippines

MANILA, PHILIPPINE ISLANDS, Feb. 15—Up to this date of the present year 4255 cars and trucks have been registered in the Philippine Islands. The figures, compiled by the Estrella Auto Palace, distributor of Michelin tires and Dodge Brothers, Hudson, Hupmobile and Renault cars, shows the predominance of light cars.

Up to 1916 the Philippine automobile law required only one registration on original sale. In the figures that follow, the totals for the first 3 years represent only the cars that were imported and sold. In 1918 the total represents the total registration.

Make	Feb. 5, 1913	Feb. 5, 1914	Feb. 24, 1915	Dec. 10, 1915	Feb. 15, 1918
Dodge Brothers.....	109	268	421	48	574
Hupmobile	109	268	421	521	565
Overland	66	107	192	283	583
Ford	80	133	212	301	487
Bulck	90	136	188	239	421
Hudson	69	84	114	129	214
White	31	71	101	118	206
Studebaker	5	48	74	108	168
Maxwell .....	..	..	..	33	157
Renault	51	73	86	91	62
Cadillac	20	36	43	61	58
Chalmers	51	81	89	89	51
Reo	33	49	61	73	49

1918 Rubber Imports Increase

4,779 Tons' Increase So Far This Year—Statistics Disprove Shortage Rumors

NEW YORK, April 15—More rubber arrived in the United States during the first three months of 1918 than in the same period of 1917, the exact increase being 4779 tons. There have been some difficulties with transportation, however, which may have caused the circulation of rumors, not based on fact, that there exists a shortage of rubber.

During the first three months of 1917 imports of rubber totaled 41,574 tons as against 46,453 tons for the first three months of 1918. January and February both show substantial increases over the same months last year, though imports fell off slightly in March. Following are the statistics, as compiled by the Rubber Association of America:

Month	1917, Tons	1918, Tons
January	12,788	16,084
February	10,162	13,108
March	18,624	17,161
Total	41,574	46,353

During the entire year of 1917 a total of 167,062 tons of rubber was imported. This represents an increase of 45 per cent over the importations for the year 1916.

Although there is plenty of rubber coming into the country, its transportation in the United States is causing slight worry. Most of the Akron rubber mills, for example, receive their shipments of rubber at a Pacific Coast port of entry. This means shipment across the continent by freight, and it is here that the delay occurs. It is stated that it is not uncommon for shipments to be en route for two or three months, and in one case a shipment which left the Pacific Coast last November has not yet reached its destination. It is hoped that some of the transportation troubles will be smoothed away with the coming of better weather.

Diffin and Stout in Aircraft Hearing

WASHINGTON, April 16—Frank G. Diffin, of the Aircraft Production Board, who headed the American delegation to the conference on International Standards held recently in England, has returned to Washington. He and William B. Stout, technical adviser of the board,

testified before the Senate Military Affairs Committee to-day in a secret executive session.

Rural Express Costs Estimated by Congress Committee

WASHINGTON, April 16—The committee on the Post Office and Post Roads of the House of Representatives compiled the following figures in reference to the cost of operating rural express service in the United States:

One-Half Ton Truck

12 miles per gallon of gasoline, 2609 gallons at 25 cents.....	\$652.00
31,300 miles on tires, at 1½ cents per mile	465.50
31,300 miles—repairs, at 1 cent per mile	313.00
Oil, grease and incidentals, at ¼ cent a mile.....	78.00
Garage rental, at \$7 a month.....	84.00
Depreciation, 25 per cent.....	114.00
Interest on investment.....	22.50

Total	\$1,729.00
Salary of driver.....	1,200.00
	\$2,929.00

One-Ton Truck

10 miles per gallon of gasoline, 3130 gallons at 25 cents.....	\$782.50
31,300 miles on tires, at 1½ cents per mile	468.50
31,300 miles—repairs, at 1 cent per mile	313.00
Oil, grease and incidentals, at ¼ cent per mile.....	78.00
Garage rental, at \$7 per month.....	84.00
Depreciation, 25 per cent.....	465.00
Interest on investment.....	93.00

Total	\$2,284.00
Salary of driver.....	1,200.00
	\$3,484.00

Per day.....	\$11.13
Per mile.....	.11
Per pound, based on 1 ton per day .....	.0055
Depreciation, 25 per cent. Actual use of car, three years, and sale or exchange value at end of that period.	

Note all estimates are maximum costs, at present high prices for labor and equipment, although it is believed that a one-half ton car will be utilized in a majority of instances, as it will transport not more than approximately one-half ton each way, while being capable of overload capacity, if necessary, in emergency.

To carry one-half ton each way, as contemplated, on a 50-mile route, out and return, the cost would be.....	\$7,765
Plus labor.....	1,200

Total	\$2,965
Or \$9.46 per day, or \$0.095 per mile, or 0.0047 cent per pound.	

To Order 15,000 More B Trucks

WASHINGTON, April 16—Motor truck manufacturers will soon be asked to file bids for 15,000 class B heavy duty standardized war trucks. The government is having specifications drawn to help the manufacturers. When placed, these orders will make a total of 25,000 B trucks, including the 10,000 now in production.

Revise Export List as Conservation Measure

No Definite Prohibition of Shipment of Included Articles— Licenses May Be Issued for These When Shipping and Production Conditions Warrant Foreign Trading

WASHINGTON, April 15—To further conserve certain materials and articles the War Trade Board has issued a revised export list effective to-day.

While the Board does not positively state that it will refuse export license on any of the articles or materials mentioned in the list, to any nation on the globe excepting the enemies of the United States and its Allies, it is understood that, in the main, licenses will only be granted for these materials and articles to Britain, France and Italy, and their colonies, possessions and protectorates. In some instances it is quite possible that licenses will be refused for shipment to these countries, depending upon the urgency of conservation at home.

These rulings have only two exceptions. Certain materials and articles mentioned in the list can be shipped to Canada and Newfoundland without export license. Exports with a value of less than \$100 may in the majority of cases be shipped without license.

The War Trade Board states that it cannot express positive or specific rules to govern shipments. While on one day certain materials for certain countries will be refused license the same materials may be granted a license at another time, depending entirely upon the conditions that arise in this country.

The Board states positively that the issuance of this list and the naming of the colonies, possessions and protectorates of Britain, France and Italy, does not necessarily mean that the articles named therein could not be shipped to China, Brazil or some other friendly nation, although it is not likely that the license will be granted. The only certain way for shippers to learn if they can export, for example, aeronautical instruments to Brazil, is to make application for license.

The following articles may be shipped to Canada and Newfoundland without individual export license:

Aluminum and all articles containing aluminum.

Brass and all articles containing brass excepting brass pipes, brass plates, brass sheets, brass tubes.

Copper and all articles containing copper excepting copper pipes, copper plates, copper sheets, copper tubes, copper sulphate, chemical compounds of copper, nickel and all articles containing nickel excepting chemical compounds thereof and nickel alloy.

Articles manufactured of rubber.

Individual licenses are required for each commodity shipped. This license is applied for on Form X. Where additional forms to Form X are required, this is specified. For example, steel alloys require application on Form X and Form X2.

Following is the complete revised export conservation list:

Revised Export List

Acetate of cellulose, X2.
Acetate, all, X2.
Acetone, X2.
Aeronautical instruments.
Aeronautical machines, their parts and accessories.
Alloys, nickel, X2.
Alloys, steel, X2.
Aluminum, sulphate of, X2.
Aluminum and all articles, containing 10 per cent or more (in weight) of aluminum, X2. (Individual licenses not required to Canada and Newfoundland.)
Anti-aircraft instruments, apparatus, and accessories.
Anti-friction metal, X2.
Antimony, X2.
Antimony, black, X2.
Antimony, ore, X2.
Antimony, oxide of, X2.
Antimony, salts, X2.
Antimony, sulphate of, X2.
Antimony, sulphide of, X2.
Asbestos.
Asbestos mill fibres, all grades.
Axle and other mineral oil greases.
Babbitt metal, X4.
Belting, leather, X3.
Blast furnaces, open hearth.
Block tin, X4.
Bluestone (copper sulphate) X2.
Boiler plates and all other classes of iron and steel plates 1-8 in. thick and heavier and wider than 6 in. and circles over 6 in. in diameter, whether plain or fabricated. This includes No. 11 B. W. gage, X2.
Boilers, marine.
Boring machines, horizontal and vertical.
Boring mills (vertical, all sizes).
Brass and all articles containing 10 per cent or more (in weight) of brass, except for brass commodities listed below, X2 (individual licenses not required to Canada and Newfoundland).
Brass pipes, X2.
Brass plates, X2.
Brass sheets, X2.
Brass tubes, X2.
Cable (iron and steel) consisting of 6 wires or more, X2.
Cable, stud-link chain.
Carbon, electrodes, X2.
Castor oil, X2.
Castor oil, sulphated, X2.
Cellulose, acetate of, X2.
Chain, stud-link, open link.
Coal, X2 (individual licenses not required to Canada and Newfoundland).
Coke, X2 (individual licenses not required to Canada and Newfoundland).
Copper, as follows:
Ingots, X2.
Rods, X2.
Scrap, X2.
Tools, X2.
Wire, X2.
All articles containing 10 per cent or more (in weight) of copper, X2. (Individual licenses not required to Canada or Newfoundland, except for copper commodities listed below.)
Copper pipes, X2.
Copper plates, X2.
Copper sheets, X2.
Copper tubes, X2.
Crude oil.
Cylinder oil.
Drilling machines, radial.
Drills (carbon and high-speed twist).
Drills, twist.
Egyptian cotton.
Engine oil.
Engines, marine.
Ferrochrome, X2.
Ferromanganese, X2.
Ferrotungsten, X2.
Files (Abrasive).
Formaldehyde.
Furnaces, open hearth.
Furnaces, steel.
Gas oil.
Gasoline.
Graphite and articles manufactured therefrom, X2.
Greases, as follows:
Axle and other mineral oil greases.
Grinders, internal, plain and universal.
Gutta-percha.
Ingots, steel, X2.
Instruments as follows:
Dental.
Oil-well drilling and accessories.
Optical.
Surgical.
Iridium.
Iron plates, including ship, boiler, tank, and all other classes of iron plates 1-8 in. thick and heavier and wider than 6 in. and circles over 6

in. diameter whether plain or fabricated. This includes No. 11, U. S. gage, but not No. 11, B. W. gage, X2.
Iron scrap, X2.
Kerosene oil.
Lathes, all sizes.
Lathe, chucks.
Lubricating oils.
Machines, as follows:
Boring (horizontal and vertical).
Drilling (radial).
Milling, plain and universal (except hand millers).
Oil-well drilling and accessories.
Machine tools, as follows:
Grinders, internal, plain and universal.
Horizontal and vertical boring machines.
Lathes, all sizes.
Milling machines, plain and universal (except hand millers).
Planers.
Radial drilling machines.
Slotters.
Vertical boring mills, all sizes.
Manganese, chemical compounds thereof, X2.
Manganese ore, and any metal or ferroalloys thereof, X2.
Manganese oxide, X2.
Marine engines.
Metallic potassium, X2.
Metallic tin, X4.
Mica.
Mica splitting.
Micrometers.
Mineral grease.
Mineral oils.
Naphtha.
Nickel and all articles containing 10 per cent or more (in weight) of nickel, X2 (individual license not required for Canada and Newfoundland, except for nickel commodities listed below).
Nickel alloys, X2.
Oils, as follows:
Crude.
Cylinder.
Engine.
Fuel.
Gas.
Kerosene.
Lubricating.
Petroleum.
Paraffin.
Paraffin oil.
Paraffin wax.
Petroleum.
Pyrometers, equipment and thermocouples.
Rubber.
Rubber, articles manufactured thereof (individual licenses not required to Canadian and Newfoundland).
Rubber reclaimed.
Rubber scrap.
Sea Island cotton.
Searchlights and parts thereof, and generators thereof, X2.
Solder, X4.
Spruce wood.
Steel, as follows:
Alloy, X2.
Billets, X2.
Balloons, X2.
Boiler tubes, X2.
Ingots, X2.
Oil well casings, X2 (frequently described as boring tubes).
Plates, including ship, boiler, tank, and all other classes of steel plates, 3/4 in. thick and heavier and wider than 6 in. and circles over 6 in. diameter, whether plain or fabricated. This includes No. 11 U. S. gage, but not No. 11, B.W. gage, X2.
Scrap, X2.
Sheet bars, X2.
Slabs, X2.
Wire rope, cable, or strand, consisting of six wires, or more, X2.
Tachometers.
Tankage.
Tank plates, iron and steel, and all other classes of iron and steel plates, 3/4 in. thick and heavier and wider than 6 in. and circles over 6 in. diameter, whether plain or fabricated. This includes No. 11 U. S. gage, but not No. 11 B.W. gage, X2.
Tin, as follows:
Any metallic alloy containing tin, X4.
Block, X4.
Bottle caps, X4.
Chloride of, X2.
Collapsible tubes, X4.
Compounds of, X2.
Empty container, X4.
Foil and composition foil containing tin, X4.
Metallic, X4.
Ore, X4.
Phosphorized, X4.
Pig, X4.
Plate, X4.
Scrap, X4.
Tetrachloride, X2.
Tungsten, any chemical compound thereof, X2.
Tungsten ore, and any metal or ferro alloy thereof, X2.
Vanadium, X2.
Varnish.
Vertical boring machines.
Vertical boring mills (all sizes).
Wax, paraffin.
White metal, X4.
Wire, copper, X2. (Individual licenses not required to Canada and Newfoundland).
Wire rope, cable or strand (iron and steel), consisting of six wires or more, X2.
Zinc and its compounds.
Zinc sulphate.
Zinc, white (dry).

FORM X

WAR TRADE BOARD
BUREAU OF EXPORTS

APPLICATION FOR EXPORT LICENSE

THIS FORM IS TO BE USED IN APPLYING FOR EXPORT LICENSE TO SHIP ALL COMMODITIES TO ANY COUNTRY, IN ACCORDANCE WITH THE PROVISIONS OF THE WAR TRADE ACT, WHICH MUST BE CAREFULLY FOLLOWED. ANSWERS SHOULD BE TYPEWRITTEN, BUT WILL BE CONSIDERED IF WRITTEN LEGIBLY.

App. No. _____
Disposition _____
Date _____
Expiration date _____
Drawn by _____
Checked by _____

(SPACE ABOVE THIS LINE FOR OFFICIAL USE ONLY.)

WAR TRADE BOARD,
BUREAU OF EXPORTS,
Washington, D. C.

(Country of destination must be stated here.)

I hereby apply for a license to export the merchandise named herein.

(1) Date _____ (2) Applicant's Reference No. _____

Applicant (Sign here): By _____

Address _____

Acting as _____

(State whether principal or acting agent, broker or factor in this transaction, and if so, give name and address of the person or firm for whom so acting.)

(4) Consignor's Name _____ Nationality _____ Year established _____
Address _____
Acting as _____
(State whether principal or acting agent, broker or factor in this transaction, and if so, give name and address of the person or firm for whom so acting.)

(5) Number and kind of packages, to be sent by _____
(6) Commodity _____
(7) Quantity _____
(8) Value _____
(9) For official use only.

(10) Date of contract _____

(11) Consignee's Name _____ Nationality _____ Year established _____
Address _____
Acting as _____
(State whether principal or acting agent, broker or factor in this transaction, and if so, give name and address of the person or firm for whom so acting.)

(12) Purchaser abroad Name _____ Nationality _____ Year established _____
Address _____
Acting as _____
(State whether principal or acting agent, broker or factor in this transaction, and if so, give name and address of the person or firm for whom so acting.)

(13) License to be sent to _____
Name _____
Address _____
Acting as _____
(State whether principal or acting agent, broker or factor in this transaction, and if so, give name and address of the person or firm for whom so acting.)

(14) State whether or not goods are to be reshipped, and if so, to whom. Name _____ Nationality _____ Year established _____
Address _____
Acting as _____
(State whether principal or acting agent, broker or factor in this transaction, and if so, give name and address of the person or firm for whom so acting.)

(15) Indicate proposed routing, giving, if possible, name of railroad and name of steamship line or vessel _____

(16) Under what flag is vessel registered? _____
(17) Has any other application been filed for license to cover this shipment? If so, state by whom _____
(18) How long have you been doing business with (a) the Consignee and (b) the person for whom he is acting? (a) _____ (b) _____
(19) How long have you been doing business with (a) the Consignor and (b) the person for whom he is acting? (a) _____ (b) _____

NOTE: The above questions must be answered in all cases. See instructions on reverse side hereof.

Application Form for Export Licenses

Applicants for licenses to export commodities listed on the opposite page are required to fill out the Application for Export License which is illustrated herewith. This is the principal form and must be used in every case. Certain commodities require a different and supplemental form, which must be filed with the one illustrated

IF THERE IS REASONABLE CAUSE TO BELIEVE THAT THE EXPORTATION DESCRIBED HEREIN INVOLVES TRADING DIRECTLY OR INDIRECTLY WITH AN "ENEMY" OR "ALLY OF ENEMY," OR WITH A PERSON ACTING ON BEHALF OF, OR FOR THE BENEFIT OF, AN "ENEMY" OR "ALLY OF ENEMY," AS DEFINED IN THE TRADING WITH THE ENEMY ACT APPROVED OCTOBER 6, 1917—A SEPARATE APPLICATION FOR LICENSE SO TO TRADE MUST BE MADE ON FORM ET-6 AND SECURELY ATTACHED HERETO AND FILED HERewith, UNLESS A GENERAL LICENSE SO TO TRADE HAS BEEN OBTAINED, WHICH FACT MUST BE STATED HEREON.

[PASTE TOP OF SUPPLEMENTAL INFORMATION SHEET HERE.]

SUPPLEMENTARY INFORMATION SHEETS, WHEREVER REQUIRED, SHOULD BE PASTED OVER THESE INSTRUCTIONS.

PLEASE READ CAREFULLY BEFORE FILLING IN APPLICATION. THIS WILL AVOID DELAY.

- A separate application must be made for each commodity.
- To avoid delays, applicants are requested, in case of further communication, to refer to their own reference number and date as well as to the reference number of the Bureau of Exports, and to refer to each application in a separate letter.
- Responsibility of exporter.—(1) Neither failure on the part of the applicant to take reasonable precaution as to the distribution of goods, nor the granting of an export license based upon the statements contained in this application will relieve the consignor from any responsibility which he may be liable for affording aid or comfort to the enemy.
- Any attempt to export a commodity differing in any way from that for which license has been granted is an attempt to export goods without license and subjects the exporter to the penalty of the law.
- In the case of goods which have to be specially manufactured, applicants are advised to send in their applications before starting the work and to answer Question 9 fully. In all cases applications should be sent in at least two weeks in advance of the proposed date of shipment from place of origin or as much earlier as possible. Licenses will be granted ordinarily for a period of 90 days, except in special cases which will take longer than 90 days to specially manufacture articles. If a license is desired, good for a period longer than 90 days, state reasons specifically.
- No extension of license will be granted.
- This application, properly filled in and signed, should be sent to the Bureau of Exports, Washington, D. C., or any branch of that Bureau. Copies of all forms may be secured from the Bureau of Exports, Washington, D. C., or from any branch thereof.

Branches are located at:

Boston, Mass., 1806 Customhouse
Chicago, Ill., Monach Block
Eagle Pass, Tex., First National Bank Building
El Paso, Tex., Federal Building
Detroit, Mich., 225 Post Office Building
Houston, Tex., Federal Building
Los Angeles, Cal., Federal Building
Mobile, Ala., Customhouse
New Orleans, La., Canal Bank Building
New York, N. Y., 45 Broadway
Nogales, Ariz., Bowman Hotel Building
Philadelphia, Pa., 303 Lafayette Building
Portland, Oreg., 715 Morgan Building
St. Louis, Mo., Federal Reserve Bank Building
San Francisco, Cal., 214 Commercial
Savannah, Ga., Savannah Bank and Trust Co. Building
Seattle, Wash., 102-20 Henry Building

- An export license is not required to export to the noncontiguous possessions belonging to the United States, although export declarations are required to be filed in duplicate.
- This form should not be used for application to export coin, bullion and/or currency, application for which should be made to any Federal Reserve Bank or to the Treasury Department, Washington, D. C.

SPECIAL INSTRUCTIONS FOR DIFFERENT COUNTRIES.

SWITZERLAND.—Anything heretofore contained in the contrary notwithstanding, all original applications and/or applications for license for goods to export to Switzerland should be sent to the War Trade Board, Bureau of Exports, Washington, D. C., and the license will then be sent to the War Trade Board, Bureau of Exports, which will, in turn, send all licenses or returns back to the Legation of Switzerland. All commodities to be shipped to Switzerland must be consigned to the Société Générale de Surveillance Economique, Bern, Switzerland, and it will not be necessary for applicant to answer Question 14 on the face hereof.

INSTRUCTIONS REGARDING SUPPLEMENTAL INFORMATION SHEETS.

Applicants are hereby advised that supplemental information, in addition to the questions to be answered on this form hereof, is required to be furnished regarding certain commodities. Consult the "Journal of the War Trade Board" for this list of such commodities and the number of the proper form containing supplemental questions to be used for each specific commodity. Obtain the proper supplemental information in the form and in the number indicated in the "Journal of the War Trade Board" and attach same to this application. This will facilitate prompt consideration of the application.

Men of the Industry

*Changes in Personnel and
Position*

Several Changes Made in Republic Truck Personnel

ALMA, MICH., April 16—The Republic Motor Truck Co. has made several changes in its personnel. M. E. Holmes, general sales manager, has resigned, and C. A. Miller, assistant general sales manager, has succeeded him. F. W. Gargott, advertising manager, and Cecil Taylor, chief engineer, have also resigned from the company.

George R. Beamer, for the last 12 years connected with the United Gauge Co., as Detroit representative, has been appointed Detroit branch manager of the Federal Ball Bearing Co., Poughkeepsie. He will not sever his connection with the United Gauge Co., but handle work for both organizations at the same time.

H. J. Detterich has been appointed advertising manager of the Bearings Service Co., Detroit. He was formerly assistant advertising manager of the Paige-Detroit Motor Car Co., and previous to this was connected with the advertising department of the Studebaker Corp.

L. E. Wood, formerly a designing engineer of the Cadillac Motor Car Co., has been appointed assistant chief engineer of the Mitchell Motors Co., Racine.

John D. Wilson has been appointed chief engineer of the carriage division of the Packard Motor Car Co., Detroit, succeeding G. H. Brodie, who was recently transferred to the aircraft engineering staff. Formerly Mr. Wilson was assistant carriage chassis engineer.

Col. H. P. Bope has resigned his position as vice-president and sales manager of the Carnegie Steel Co., Pittsburgh, to devote his time to private interests. He has been succeeded by William G. Clyde.

L. V. Hansen has joined the Emil Grossman Mfg. Corp., Brooklyn, and will obtain equipment contracts for spark plugs.

Sidney S. Frank, formerly with the American Motors, Inc., has been appointed export representative of the Emil Grossman Mfg. Corp., Brooklyn.

Thomas P. Myers, vice-president and sales director of the General Engineering Co. and the Doble-Detroit Steam Motors

Co., Detroit, has resigned. He will probably enter government service.

E. A. Hornbostel has been appointed manager of the Chicago branch of the Findeisen & Kropf Mfg. Co., Chicago.

J. F. Richman has resigned his position as factory manager of the Cole Motor Car Co. and has been appointed manufacturing manager of the Allen Motor Co., Fostoria, Ohio.

M. A. Hollinshead has been appointed advertising manager of the Saxon Motor Car Co., Detroit.

Fred R. White, formerly first vice-president of the Baker R. & L. Co., Cleveland, has been elected president, succeeding Charles L. F. Wieber. The latter was elected chairman of the board of directors, and is retiring from active participation in the business. E. J. Bartlett has been elected first vice-president and general manager to fill the place vacated by Mr. White.

H. W. Bundy, who was factory manager of the Diamond Mfg. Co. before its consolidation with the Motor Products Corp., Detroit, and who has since been manager in charge of the stamping division of the latter company, has resigned. He has not announced his future plans yet.

Herbert A. Jackson has been elected president of the Chicago Pneumatic Tool Co., Chicago, to succeed W. O. Duntley, resigned. Mr. Jackson was formerly associated with the Bethlehem Steel Corp.

F. C. Brown has been appointed advertising and sales manager of the Sanford Motor Truck Co., Syracuse, N. Y.

George McIntyre has resigned his position as sales manager of the Commonwealth Finance Corp., New York. He will announce his future plans about May 1.

L. W. Coppock has resigned as chief engineer of the Higrade Motors Co., Harbor Springs, Mich.

J. E. Eckenrode has been appointed district sales manager of Fuller & Sons Mfg. Co., Kalamazoo, Mich. He will have headquarters in Detroit.

Frederick Dickinson has been appointed assistant sales manager of the Hupp Motor Car Corp., Detroit. For the last 3 years he has been advertising manager of the company, and will continue in charge of this in conjunction with his new duties.

H. E. Westerdale has resigned as assistant sales manager of the Hupp Motor Car Corp., and has become associated with the McCord Mfg. Co., Detroit.

New Companies Formed

*Latest additions to ranks of
Automotive Industries*

Automotive Parts Made by New Detroit Company

DETROIT, April 14—A new company, styled the Automotive Mfg. Co., has been incorporated here for \$125,000, to manufacture universal joints, pressed steel parts, steering links and ball and socket joints. Production will start within a week and about half of this will be for the government. Eventually, it is expected that 90 per cent will be government work.

The company now occupies a temporary building. Its new plant will be completed by July 1. The officers of the company are: I. D. Shaw, president; George Buechler, vice-president; Joseph H. Smith, secretary.

Carolina to Have Airplane Plant

RALEIGH, N. C., April 16—The Carolina Aircraft Co. has been organized here with an authorized capital of \$500,000, of which \$20,000 has been paid in. The stockholders are Harry N. Atwood, Howard White, John A. Park and J. M. Broughton. The first airplane is to be completed in 60 days.

Pyrene Men Form Allen Sales Service

NEW YORK, April 16—C. Louis Allen, president of the Pyrene Mfg. Co., has resigned from that organization and has organized the Allen Sales Service, Inc., which will be a manufacturers' service bureau. Associated with Mr. Allen are 3 more Pyrene men, T. F. Flanagan, sales and advertising manager; W. H. Yetman, in charge of the fire appliance department, and D. V. Stratton, production manager. The latter will be chief engineer in the new company.

Weidely and Cleveland Tractor Pool Efforts

CLEVELAND, April 11—George Weidely, vice-president of the Weidely Motors Co. of Indianapolis, has become associate engineer for the Cleveland Tractor Co., thereby establishing a closer relationship between the two companies. The tractor company has sent A. F. Knoblock, its general manager, to the Weidely plant as general manager. Each executive spends 2 days a week in the plant of the other company.

The Weidely company has a large contract with the tractor company for engines, and by exchanging their executives in this manner the two companies are able to bring their efforts into closer harmony.

Haskelite Unit Ready for Installation of Machinery

GRAND RAPIDS, MICH., April 13—The first of a group of units to be built by the new Haskelite Co., which will manufacture special veneer airplane parts, has been completed and is ready for the installation of machinery. The dimensions of the present building are 200 x 525 ft. and it contains 2½ acres of floorspace. Between 500 and 600 people will be employed in this one unit alone.

Columbus Tractor Elects Officers

COLUMBUS, OHIO, April 15—The Columbus Tractor Co., recently incorporated with a capital of \$1,000,000 to manufacture farm tractors in Columbus, has completed its organization with the election of Foster Copeland as president; Fred A. Miller, vice-president; George H. Barker, secretary, and E. R. Sharp, treasurer. Marion McIntyre, head of the McIntyre Mfg. Co., which was taken over by the new corporation, will be sales manager. The executive committee is composed of Walter A. Jones, Foster Copeland, Fred A. Miller, George H. Barker and Hugh Ridenour.

Standard Crucible Building Addition

MILWAUKEE, April 15—The Standard Crucible Steel Co. is erecting a foundry addition to increase its casting production as required by unfilled orders. The additional facilities will be ready about May 15.

U. S. Gearshift Plant Started

EAU CLAIRE, WIS., April 15—The United States Auto Gearshift Co. has started work on the erection of the first unit of its new plant. This will be completed about June 1. In the meantime the company is manufacturing a hydraulic gearshift device under contract with the Eau Claire Mfg. Co.

Packard to Make 4-Ton Truck Again

DETROIT, April 16—The Packard Motor Car Co. expects to put on the market 400 4-ton trucks in July. It has been a year and a half since the company has produced trucks of this model.

Bollstrom Motors Factory Site Chosen

INDIANAPOLIS, IND., April 15—The Bollstrom Motors Co., Inc., recently organized, has selected a 10-acre site in Marion, Ind., for a factory, where it will manufacture four-wheel drive trucks and tractors. The plant will contain 320,000 sq. ft. of floorspace, according to present plans.

Ross and Hal Equipment to Be Auctioned

CHICAGO, April 15—The stock and equipment of two motor car companies will be auctioned by Samuel L. Winter-niz & Co. shortly. On April 26 the entire stock of supplies, accessories, machinery, furniture and 10 finished cars

Current News of Factories

*Notes of New Plants—Old
Ones Enlarged*

belonging to the Hal Motor Car Co. will be put under the hammer at Cleveland. On May 14 the entire stock and equipment of the Ross Motor Car Co., Detroit, the inventory value of which is \$150,000, will be auctioned off.

Electric Storage Battery Orders

PHILADELPHIA, April 16—The Electric Storage Battery Co. has unfilled orders in excess of \$7,500,000, more than three times the amount of a year ago. Many government contracts have been received and the company is making batteries for trucks, submarines, subchasers and wireless equipment. These government orders comprise a large percentage of the company's business.

Anderson Electric Specialty to Move

CHICAGO, April 15—The Anderson Electric Specialty Co. will move to its new factory at 118 South Clinton Street on May 1. The manufacturing capacity of the company will be trebled.

Addition for Gillette Rubber

EAU CLAIRE, WIS., April 15—The Gillette Rubber Co. is erecting a two-story stockroom, warehouse and shipping building. Work is already well under way, and it is planned to have the unit ready by June 1.

Dividends Declared

The United States Rubber Co. has declared a regular quarterly dividend of 2 per cent on the first preferred stock, payable April 30 to stock of record April 15.

The Fisher Body Corp. has declared the regular quarterly dividend of 1¾ per cent on preferred stock, payable May 1 to stock of record April 20.

Capital Increase

AKRON, OHIO, April 15—The Mohawk Rubber Co. has increased its capitalization from \$1,050,000 to \$2,050,000, and has voted a 20 per cent stock dividend to stockholders. In addition the company has declared the regular 2½ per cent cash dividend on common stock.

Shelby in Production

SHELBY, OHIO, April 15—The Shelby Tractor & Truck Co., formerly the Standard Mfg. Co., has started production on a ¾-ton truck and a two-plow tractor. The company has been experimenting and developing these models for 2 years.

Harroun Motors Corp. Gets Government Order for Shells

WAYNE, MICH., April 13—The Harroun Motors Corp. has received an order for a large quantity of 155 mm. shells, and is now installing \$500,000 worth of new machinery to produce them. Vice-president Ray Harroun is devoting his attention to a revision of the plant arrangement, and is having this done without interrupting the regular passenger car production.

Ford Plant Closed to Visitors

DETROIT, April 16—The Ford Motor Co. has barred visitors from its plant, under rigid orders from the government. The organization formerly maintained a courtesy department which furnished guides familiar with all phases of the industry.

Distributor Building Trailers

PORTLAND, ORE., April 15—Wentworth & Irwin, Oregon distributors for the G. M. C. truck, are building in their own shops in Portland at the rate of one a day 5-ton logging trailers for the spruce production division of the Signal Corps. These will be used in hauling rived spruce from the logging camps to rail shipping points. Fifteen of the trailers were delivered last week to the Government and another 30 are being manufactured on the same order. The trailer is called the Columbia and is equipped with 36 x 8 Giant Firestone solid tires.

Flechter & Co. Take Neptune Plant

LONG ISLAND CITY, N. Y., April 15—L. V. Flechter & Co. have moved to the plant of the Neptune Motor Co. at 192 Jackson Avenue. The new plant has a capacity for manufacturing more than 2500 carbureters a day.

Denby Completes Additions

DETROIT, April 16—The Denby Motor Truck Co. has completed three new assembling plants. A fleet of trucks leaves the factory every Wednesday, goes to Ohio and is loaded to capacity. Then it makes an easy trip to New York, taking five days for the run. From four drivers in the first fleet the number has increased to ten. If competent drivers can be obtained this number will be increased still further.

Wisconsin Company to Make Parts

MILWAUKEE, April 15—The Wisconsin Gear & Axle Co., a new organization formed to manufacture automotive parts, will erect its factory in Wauwatosa, Milwaukee County. The first unit will be 50 x 150, and will be enlarged later.

Columbia Starts Trailer Shipment

DETROIT, April 16—The Columbia Motors Co. started shipment to-day on its first trailer order for the government. The company expects to make 50 daily within 10 days.

Return Load Work in England

System Is Being Used to Counteract Inadequate Supply of Motor Vehicles

LONDON, March 14—Despite a great deal of talk and the expenditure of considerable effort road authorities in Great Britain have not made much progress in the work of increasing the efficiency of the admittedly inadequate supply of motor vehicles remaining in the service. This supply of motor trucks has been curtailed by the fuel shortage, and also by the difficulty of getting repairs, and having spare parts delivered.

The return-load movement has been fairly effective in some sections; it is not universally applicable. Where a truck is used for retail delivery work the full-load idea is impossible. Many sections have return-load schemes in which what is known as a traffic exchange has been established. This is practically the same as what is known as the return-load telephone exchange in Connecticut, U. S. The driver looking for a return load calls up the traffic exchange.

The case of vehicles used for retail delivery has to be handled quite differently. In this case an effort must be made to prevent overlapping of facilities. There is no reason why ten lorries should carry ten different kinds of goods to one outlying point, when the quantities handled are so small that the whole bulk could go in one or two vehicles. The object should be to see that each vehicle makes a direct out and home journey performing all its deliveries in one district, instead of allowing each vehicle to describe an irregular course. This ideal can only be reached if all goods for retail delivery can be conveyed to a central clearing house and there rapidly sorted and sent out in lorries used in the common service of all traders.

This ideal cannot be improvised during the war, though it may conceivably be adopted later on. The best that can be done now is to form groups of traders who will pool their vehicles and deliveries.

Much has been said and written about this pooling idea, but up to the present little has been done. Overlapping has been prevented to some extent by limiting the radius of action of vans operating from one particular center and by refusing to authorize supplies of fuel for journeys exceeding a certain maximum, beyond which the railway is regarded as the best means of conveyance.

All this amounts to very little progress toward complete organization. Motor users are beginning to fear that little is being done principally as a result of the influence of the railways. The past history of canals in Great Britain shows how the railways are prepared to deal with any competitor who may become dangerous. The canal system has been rendered almost use-

less by the policy of the railways, which purchased certain essential portions of the system, with a view to preventing developments. The railroads have also systematically belittled the value of canals and educated the public to an idea that inland water transport is obsolete.

One is inclined to fear that the railways are now turning their attention to the road transport vehicle, which is becoming a dangerous competitor. Railway influence is very strong in British official circles and in Parliament. It is therefore conceivable that legislative proposals adverse to motor transport will be strongly supported, and in the meanwhile that every opportunity will be taken to curtail the use of motors under a pretense of organizing transportation.

It has been recognized for some time past that government departments have been among the principal offenders in the matter of inefficient use of motors. The various departments have each conducted their own transport system independently.

This is presumably the real purpose of the recently formed Road Transport Control Board. The board is departmental in constitution. It professes to be a central board for the co-ordination of road transport generally, but there is not a single individual on it who has practical experience of the economical operation of motor vehicles in connection with commercial undertakings or the carriage of ordinary merchandise. This is not a matter which can be handled effectively by Government officials, however competent, who do not possess the necessary practical experience. The whole thing is too complicated for the theorist.

For example, the pooling system is perfect in theory and generally unworkable and always imperfect in practice. If the board were composed of men who have operated big fleets of motor vehicles in public service, for big retail stores, and on behalf of motor haulage contractors some real progress toward co-ordination could be expected as well as a proper appreciation of those difficulties that must render any attempt at progress in certain directions completely futile.

Dividends Declared

The Hood Rubber Co. has declared a quarterly dividend of 1% per cent on preferred stock, payable May 1 to stockholders of record April 20.

The Kelsey Wheel Co. has declared a quarterly dividend of \$1.75 a share on the preferred stock, payable May 1 to stockholders of record April 20.

The National Carbon Co., Inc., has declared regular quarterly dividends of 2 per cent on the preferred stock, and \$1 a share on the common stock, payable May 1 to stock of record April 20.

The Pyrene Mfg. Co. has declared a regular quarterly dividend of 2½ per cent on the common stock, payable May 1 to stock of record April 22.

Shortages Decrease Production

Many Manufacturers in Need of Materials, Freight Equipment and Labor

DETROIT, April 16—The inability to get enough materials and the shortage of labor have reduced by 20 per cent the production of many automobile manufacturers in this territory. The demands for material made by the Government has made it impossible for the parts makers to supply all the requirements of the automobile manufacturers.

These shortages are felt in many different components. The lack of one kind of part will retard the entire production.

Industries report a labor shortage varying from 100 men to 5000. The Reo Motor Car Co. needs 500 skilled mechanics, Willys-Overland 1000, Dodge Brothers 5000, Timken-Detroit Axle Co. several hundred, and the need of men is expressed from nearly all factories.

The Kelsey Wheel Co. is introducing women. Two hundred are now in active employment at this plant, and the company can still use 1000 more men.

The shortage of freight equipment has had much influence in decreasing production in many plants, for it has prevented them from obtaining much of the required material. Incoming freight transportation is a limiting factor in production schedules.

Relief of Outgoing Freight

Relief of outgoing freight has been felt during the last few weeks. The industries report that they have been able to obtain many more empties than has been possible for some time. Manufacturers who have been receiving machinery for government work availed themselves of this freight equipment and have been using it for their outgoing shipments.

A number of manufacturers, however, say they are experiencing no difficulty with freight shipments and have little trouble in getting the labor they need. But of these there are comparatively few.

The priority order termed "Preference List No. 1," it is believed, may have some effect on the automobile industry, as the range of materials used in automobiles is wide.

All the manufacturers have more orders on their books than they can take care of. This is evidence of the shortage of cars due to the inability to maintain production. Willys-Overland has unfilled orders for 19,000 cars.

Railroads Give Up Toledo Branches

BUFFALO, April 17—The Lehigh Valley and Lackawanna lines have decided to dispend with their Toledo branches as a result of meetings of the officials of the two companies here. Lackawanna branches will close May 30 and Lehigh Valley, May 31.

Industrial Review of the Week

A Summary of Major Developments in Other Fields

Iron and Steel Industry

Concentrates on War Work

Definite moves will be made this week on the project for the greatest American gun plant, which the Government and the Steel Corporation will carry out in co-operation, the latter building the steel works. The Pittsburgh district is a suggested location and a great projectile plant is to be included. The largest machine shop in the country will be provided.

Important steel companies in the Central West have notified their customers that they must concentrate on Government work for the time being, a 30-day period being named in some cases. There is a closer sifting all along the line, among both producers and consumers of steel, of Government work from commercial work, and the amount of the latter is steadily decreasing.

Plate mills, put to a test of their ability to supply the shipyards, have shown remarkable outputs, more than 110,000 tons of plates having been turned out in one April week. At this rate the mills will be caught up on shipyard deliveries early in May. The coming of Charles M. Schwab into the Government service as director general of the Emergency

Fleet Corporation will mean a further speeding of effort that is full of promise.

This week most plate mills are running 100 per cent on Government and Ally work, save such part of their product as in ordinary practice cannot meet ship requirements. Great Britain is getting 5000 tons of plates a week to apply on the 300,000 tons her yards are to have in return for British advances of munitions and other steel to the American army in France.

The situation has been complicated by the appeal of the Shipping Board to the Railroad Administration to cut down substantially the tonnage of plates it has been figuring on for cars, namely, 575,000. The Shipping Board's claim that the use of that amount of plates in cars will seriously interfere with the ship program is strongly disputed by steel makers.

War necessities, however, continue to develop, and for its extensions to its Harrison and Syracuse plants the Crucible Steel Co. of America has closed for 9500 tons of steel, while about 8000 tons is active at the moment in the East. Included is 3600 tons for elevated railroad extension in Brooklyn, for which the Bethlehem Steel Bridge Corporation is the low bidder. *Iron Age.*

Coal Distribution Plans

for 1918-1919 Being Made

Coal-distribution plans go on apace; modifications are being made to the zoning system to facilitate the shipping of coal; the Fuel Administration is rapidly winding up most of its immediate problems—but the coal itself is lacking.

The bituminous coal situation is getting worse. So far as production is concerned the past month has proved to be as barren of favorable results as any month in 1917. The basic cause for the meager output is the poor car supply furnished by the railroads. Another obstacle is the unsettled question of the price to be paid for railroad coal. Despite the pressure being brought to bear upon the director general of railroads to renounce the fuel policy promulgated by John Skelton Williams, no tangible results are yet in evidence.

Owing to the lack of cars many of the large producing mines can work only half time. This is having a demoralizing effect on mine labor. In West Virginia the mine workers are deserting the mines for the large steel mills and munitions plants, as these industries hold out the promise of high wages and regular employment.—*Coal Age.*

Germany's Monopoly Policies

(Continued from page 791)

Deutsche Bank increased its capital and reserves to half a billion marks—that is, in the neighborhood of \$125,000,000—and increased the number of its branches to over one hundred. The Disconto-Gesellschaft absorbed a number of provincial banks and increased its capital to 310,000,000 marks, over \$75,000,000.

The German government at first did not appreciate the importance of financing war expenditures by taxation as the war was in progress. The war loans were pyramided one on top of another, and interest payments on one loan would be paid out of subscriptions to the next. The result has been that the prospects of future taxation have been particularly alarming. The German government will undoubtedly endeavor to raise money in the future by monopolies as well as by taxation. THE RESULT WILL BE THAT A GREAT MANY LINES OF MANUFACTURING AND TRADE WILL IN THE FUTURE BE IN GOVERNMENT HANDS. Government monopolies in important lines have yielded foreign governments very great returns. The yield of the French tobacco monopoly has been a conspicuous example.

Among the monopolies that have been urged on the German government are the manufacturing and sale of munitions, including rifles, cannon, armor

plate, war ships, powder and ammunition, aeroplanes and war automobiles, and production and sale of tobacco, alcohol, grain, electricity, petroleum, coal and shipping.

Insurance has also been suggested as a good subject for government monopoly.

The success of state railway monopolies was urged as a good reason for a monopoly of merchant shipping. It is well known that in Germany there has existed for a long time a practical shipping monopoly, and it was urged that this should simply be transferred to the government, and should be worked in connection with the state railways. The German government has already adopted an after-war shipping program, providing subsidies to encourage speedy rebuilding, and the monopoly idea does not appear in this program. The advocates of state monopolies are belligerent in challenging their opponents to name any other method in which the government can pay its bills without actually resorting to the confiscation of property or the repudiation of debts. It is too early to predict how this monopoly movement will work out, but it is plain that establishment of certain forms of government monopoly is in prospect.

The German government is faced with the very real and very complex problem

of meeting the raw material shortage following the war, and government control over the importation of important raw materials, either direct or indirect, is practically a certainty during the after-war period. It has been recommended in a good many quarters that the government form syndicates, working under complete government control, for the importation and distribution of imported raw materials, and for the distribution of export commodities.

One point that should be made in connection with the entire subject of government control—and that includes government compulsory syndication, government price fixing, the actual government raw material companies, and the proposed after-war government import and export control companies, and government monopolies—is that they are for the most part decidedly unpopular in the business community. Many energetic organizations of business men have already submitted resolutions to the government embodying their views on the matter in no uncertain terms, protesting against government control and interferences with the ordinary channels of trade and demanding that the existing control be dropped at the earliest possible date and urging that there be no extension of control during the after-war period.

Co-operative Spirit in Flint Industries

(Continued from page 773)

reported. This, with boating and bathing, will offer many opportunities to workmen to spend many pleasurable days at this spot.

One novel feature of the I. F. L. is the establishment of stores in the factories. Here the men may buy cigars, candy, aprons, soap and many other daily necessities. There are twenty-seven factory stores, and the value of the stock carried aggregates \$20,000. The stores are in charge of a superintendent who sees that supplies are maintained. A proposition is now on foot for the establishment of lunch rooms on a similar scale to serve hot foods to employees.

The I. F. L. is now in its second year. During its short life it has been very active and has lost no opportunity of giving aid where it was needed. It has helped secure coal for men during the recent shortage and has been instrumental in getting positions for men seeking them. At Christmas time a campaign was waged to give aid to the suffering countries abroad. The slogan was "Help With a Handful." This campaign was very successful. Red Cross work, Thrift Stamp sales and other war activities came in for their share of attention. A farewell banquet was given to drafted men.

A very interesting newspaper is circulated among the employees every month, posting them on activities of the League.

French Airplane Exhibit for Washington

WASHINGTON, April 16—Arrangements have been completed for the showing in Washington of the official Aero Warfare Exhibit of France from April 24-29. The Exhibit includes many official paintings and the French aerial warfare motion pictures.

Aerial Service Planned for Norway

CHRISTIANIA, NORWAY, April 1—Business men from all parts of Norway are planning the establishment of regu-

lar aerial routes for freight and passenger service. The route will cover many Norwegian towns, as well as points in foreign countries. A company styled A. S. Norsk Luftfartrederi has been formed for this purpose and complete plans have been made.

Jones Speedometer Adds to Plant

NEW ROCHELLE, April 16—The Jones Speedometer Co. has built an addition adjoining its factory. The new building is 4 stories high and 76 x 170 ft.

Detroit Quota Oversubscribed

DETROIT, April 16—Detroit's \$36,000,000 for the Third Liberty Loan was oversubscribed by noon of April 12, the fifth day of the drive. The total subscriptions on that day were \$38,652,625, and a new quota of \$60,000,000 was set by the committee.

In addition to the subscriptions quoted in last week's issue of AUTOMOTIVE INDUSTRIES the following have been announced:

Detroit Steel Casting Co.	\$100,000
Paige-Detroit Motor Car Co.	100,000
Continental Motor Corp.	60,000
National Twist Drill Co.	50,000
Federal Motor Truck Co.	40,000
Hupp Motor Car Corp.	30,000
Penberthy Injector Co.	25,000
Roy D. Chapin	25,000
Howard E. Coffin	25,000
National Can Co.	25,000
Detroit Twist Drill Co.	25,000
Wilson Body Co.	20,500
Gear Grinding Machinery Co.	11,000
Kales Stamping Co.	10,000
Capitol Brass Works	10,000
Roberts Brass Mfg. Co.	10,000
Mutual Electric & Machine Co.	10,000
Detroit Branch, International Harvester Co.	10,000
Gemmer Mfg. Co.	10,000

To Widen Michigan Boulevard

CHICAGO, April 14—Work was started yesterday on the widening of Michigan Boulevard. It is hoped that this will relieve the traffic congestion and provide a straight link between the boulevard systems of the north and south sides of the city.

Tractor Engine Lubrication

(Continued from page 778)

The problem is one of co-operation among the motor engineers, ignition and carburetor men and the oil people. To insure lubrication efficiency and freedom from lubrication troubles in the field, the tractor manufacturer must first ascertain the oils suitable for his engine; second, recommend a sufficient number of them to cover all territories and insist on their use, and, third, help educate the tractor owner in the care and importance of correct lubricating oil. This need cause no discrimination as regards oil refiners, because it is possible to find several oils from various sources which are equally suitable for any particular engine.

In conclusion I wish to repeat that I believe the field of lubrication offers fully as big an opportunity for research and development as any other in tractor work, and that such research and development must be carried out in conjunction with carburetion, ignition and engine design.

Want 2000 Men for Tank Corps

NEW YORK, April 16—A national campaign to recruit 2000 men for the United States Tank Corps has been started, and the inducement offered is that men in this branch have an opportunity to see active service more quickly than in any other division of the army.

Men from 18 to 21 and 31 to 45 years of age may apply, and it is possible that men of draft age with unusual qualifications may also be accepted. All enter as privates, and are rated according to their ability after a short period of intensive training at the tank camp in Gettysburg, Pa.

Men of the following classifications are sought:

Tractor, motor truck and motorcycle drivers; automobile engineering mechanics; ignition experts; blacksmiths; gas acetylene welders; bench machinists; lathe hands; telegraph or radio operators; cooks and storekeepers; stenographers and typists; men of mechanical trend as machine gun mechanics and operators.

Automotive Securities Quotations on the New York Exchange

	Bid	Asked	Net Ch'ge		Bid	Asked	Net Ch'ge
*Ajax Rubber Co.	55	60	+5	*Lee Rubber & Tire Corp.	12	13	— 1/4
*J. I. Case T. M. Co. pfd.	83	86	..	*Maxwell Motor Co., Inc., com.	26	27	..
Chalmers Motor Co. com.	6	8	..	*Maxwell Motor Co., Inc., 1st pfd.	52	54	..
Chalmers Motor Co. pfd.	30	40	..	*Maxwell Motor Co., Inc., 2nd pfd.	19 1/2	21	—1
*Chandler Motor Co.	79	81	—4	Miller Rubber Co. com.	106	109	—3
Chevrolet Motor Co.	119	122	+2	Miller Rubber Co. pfd.	96	98	..
*Fisher Body Corp. com.	30	35	..	Packard Motor Car Co. com.	92	96	—1
*Fisher Body Corp. pfd.	80	84	+ 1/2	Packard Motor Car Co. pfd.	89	92	..
Fisk Rubber Co. com.	50	53	..	Paige-Detroit Motor Car Co.	16	18	..
Fisk Rubber Co. 1st pfd.	98	103	..	Peerless Truck & Motor Corp.	14	16	..
Fisk Rubber Co. 2nd pfd.	70	75	..	Portage Rubber Co. com.	106	110	+3
Firestone Tire & Rubber Co. com.	93	96	+1	Reo Motor Car Co.	14	16	—1
Firestone Tire & Rubber Co. pfd.	96	98	..	*Saxon Motor Car Corp.	7	9	..
*General Motors Co. com.	117 1/2	119 1/2	—1 1/2	Standard Motor Construction Co.	11 1/2	12 1/2	— 1/2
*General Motors Co. pfd.	80	82	..	*Stewart-Warner Speed. Corp.	53	55	—1
*B. F. Goodrich Co. com.	42	44	—1	*Studebaker Corp. com.	38	39	—1 1/2
*B. F. Goodrich Co. pfd.	95	100	— 1/2	*Studebaker Corp. pfd.	80	90	..
Goodyear Tire & Rubber Co. com.	138	140	+1	Swinehart Tire & Rubber Co.	25	35	—5
Goodyear Tire & Rubber Co. pfd.	97	99	..	United Motors Corp.	25 1/2	25 1/2	— 1/4
Grant Motor Car Corp.	3	4	..	*U. S. Rubber Co. com.	52	53	—3
Hupp Motor Car Corp. com.	23 1/2	3 1/2	..	*U. S. Rubber Co. pfd.	104	105	..
Hupp Motor Car Corp. pfd.	83	87	—1	*White Motor Co.	41	43	..
International Motor Co. com.	21	23	—3	*Willys-Overland Co. com.	17	18	— 1/2
International Motor Co. 1st pfd.	52	56	—2	*Willys-Overland Co. pfd.	80	81	..
International Motor Co. 2nd pfd.	23	28	..				
*Kelly-Springfield Tire Co. com.	42	45	—2				
*Kelly-Springfield Tire Co. 1st pfd.	77	83	—2				

*At close April 13, 1918. Listed N. Y. Stock Exchange.

Milwaukee Establishes Washington Bureau

MILWAUKEE, April 15—An Industrial Bureau has been established by Milwaukee manufacturers and business men, which will gather and distribute information useful to them in getting government work. A fund of \$35,000 has been raised by popular subscription under the direction of the Milwaukee County Council of Defense to maintain the bureau.

Plan Fire Prevention in War Plants

WASHINGTON, April 15—The War Industries Board has created a fire protection section which will maintain close inspection of factories engaged in Government work. It is hoped this section will minimize the possibilities of fires in munitions plants and all war factories.

It will be assisted by the Navy and Army Intelligence Bureaus, district and local fire inspection services, state fire marshals and insurance underwriters.

All Champion Employees Subscribe to Loan

FLINT, MICH., April 15—All of the employees of the Champion Ignition Co. have subscribed to the Third Liberty Loan, the amount of bonds taken being \$45,000. The company, as an organization, subscribed for \$50,000 worth of bonds.

Eastern Branch for Bergie Plug

NEW YORK, April 15—The Bergie National Spark Plug Co. has opened an eastern sales branch here in the Buick Building, 1737 Broadway. R. M. Hodes, the company's eastern territory manager, is in charge.

Will License Civilian Aviators

WASHINGTON, April 13—Arrangements have been made to provide licenses for civilians desiring to operate airplanes over the United States, its territorial waters and other possessions. Under the presidential proclamations of Feb. 28, civilians are not allowed to fly without a license. Licenses can be obtained for operating balloons, airplanes or hydroplanes from the joint Army and Navy Board of Aeronautic Cognizance by all aviators except army and navy officers.

The office of the joint board is at 1607 H Street, N.W., Washington. Applications should give the name of the operator, the machine to be used, names of passengers to be carried, identifying markings on the machine and other details to assure the military and naval forces as to the identity of the aircraft.

Summary of General Business Conditions as of March 23, 1918

Following is a Summary of Business Conditions on March 23, as Reported to the Federal Reserve Board:

	District No. 1— Boston	District No. 2— New York	District No. 3— Philadelphia	District No. 4— Cleveland	District No. 5— Richmond	District No. 6— Atlanta
General business.....	Active.....	Good.....	Good.....	Active.....	Active.....	Above normal.
Crops:						
Condition.....				Satisfactory.....	Prosperous.....	Good.
Outlook.....		Fair.....		Good.....	Satisfactory, except labor.	Do.
Industries of the district	Busy.....	Active.....	Very busy.....	Necessary lines busy.....	Active.....	Busy.
Construction, building, and engineering.	Below normal.....	Building light; ship-building active.	Decreasing.....	Very limited.....	Private building negligible; Government work active.	Very light.
Foreign trade.....		General trade restricted.	Do.....		Limited by freight room.	Unsatisfactory.
Bank clearings.....	Increase.....	Slight increase over same time last year.	Decrease.....	Increase.....	Increase.....	Increase.
Money rates.....	Steady at 6 per cent.....	Increasing.....	Very firm.....	Do.....	Good demand, 6 per cent.	Firmer.
Railroad, post office, and other receipts.	Railroad, decrease; post office, increase.	Heavy.....	Decreasing.....	Do.....	Railroad, irregular; post office, volume large.	Stationary.
Labor conditions.....	Scarce and well paid.....	Demand for skilled labor greater than supply.	Strong demand, high wages.	Unsettled.....	In demand, much complaint.	Unsettled.
Outlook.....	Good.....	Good.....	Good.....	Improving.....	Satisfactory and encouraging.	Generally favorable.
Remarks.....					Weather conditions very favorable, stimulating activities in all lines.	
	District No. 7— Chicago	District No. 8— St. Louis	District No. 9— Minneapolis	District No. 10— Kansas City	District No. 11— Dallas	District No. 12— San Francisco
General business.....	Good.....	Generally active.....	Good.....	Good.....	Good.....	Active.
Crops:						
Condition.....	Good, except corn.....	Good.....		Fair to good.....	Fair.....	Good.
Outlook.....	Promising.....	Favorable.....	Spring outlook good.....	More favorable.....	Generally favorable.....	Favorable.
Industries of the district	Essential industries fully employed.	Busy.....	Active.....	Active.....	Active.....	Very active.
Construction, building, and engineering.	No activity worthy of mention.	Quiet.....	Slow.....	Operations generally curtailed.	Building inactive; some revival; believed will soon be active.	13 per cent decrease over year ago.
Foreign trade.....					Satisfactory; lack of shipping has curtailed.	Large increase.
Bank clearings.....	Increase.....	Increase.....	Increasing.....	Greatly increased.....	Increase of 31.3 per cent.	Largely increasing.
Money rates.....	Firm.....	Firm.....	Firm.....	Slight increase.....	Firm; demand increasing.	Firm.
Railroad, post office, and other receipts.	Increasing.....	Increase in postal receipts.	Little change.....		Increase.....	Increasing.
Labor conditions.....	Labor generally satisfied.	Unsettled.....	Good.....	Very unsettled.....	Scarcity in many lines, even with advancing wages.	Unsettled, but improving.
Outlook.....	No misgivings.....	Encouraging.....	Do.....	Favorable.....	Favorable.....	Favorable.
Remarks.....				Weather conditions have improved farm outlook; wholesale trade is very active; mid-continent oil field production is increasing.	Favorable features obtain in all branches of business; some rainfall in drouth sections, and conditions improved, though far from normal.	

The application should state when and where it is proposed to make the flight.

By direction of the President, Major-General Geo. O. Squier, chief signal officer of the army, has been designated chairman; Col. H. H. Arnold and Lieut.-Col. Claude E. Brigham have been detailed representing the army; Capt. N. E. Irwin, Capt. T. R. Blakeley and Capt. F. H. Clark represent the navy.

1700 Motor Truck Delivery Companies Formed

DETROIT, April 13—Seventeen hundred motor truck transportation companies have been organized since Jan. 1 for inter-city deliveries, according to George B. Russel, secretary and treasurer of the Russel Motor Axle Co. He made this statement in a speech to officers, directors, department heads and employees of the organization at its war dinner last week.

Milwaukee Used Car Show Canceled

MILWAUKEE, April 15—The second annual used car show of the Milwaukee Automobile Dealers, Inc., has been postponed indefinitely because of the lack of a suitable exhibition hall. Last year the show was held in the Auditorium, but the building is now being remodeled and will not be ready before June 1. It was planned to hold the show during the last week in April.

Fiat Co. Denies Austrian Interests

TURIN, ITALY, April 15—The Fiat Co. has denied the announcement made in several newspapers that it had established new steel works in Austria, and has pointed out that there is no connection between the Fiat Co. of Turin and the Fiat Werke of Vienna.

In 1907 the Italian Fiat company collaborated with several Austrian business men and established a branch styled Fiat Werke. The latter company obtained the right to Fiat patents, the name "Fiat" as well as sales rights for Fiat cars in Austrian territory. In a short time the Italian directors sold their holdings, but the agreement with regard to patents and agency continued until the outbreak of the war. At this time all connection between the two companies was broken, and the right to use the name, trade-marks or patents of the Fiat company was withdrawn unconditionally.

Freight Situation Unchanged

Some Manufacturers Fortunate in Obtaining Cars—Number of Drive-aways the Same

DETROIT, April 15—The freight situation here is unchanged and drive-aways are as popular as ever. A few of the manufacturers who found it easier to get freight equipment during the past week have taken advantage of the opportunity and have reduced their drive-aways. But those who were less fortunate in obtaining freight cars have increased their drive-aways, making the aggregate about the same as it has been.

Records show that the Oldsmobile company has saved the Government 366 freight cars in less than three weeks. In other words, the company, through its drive-away plan, has practically released 366 freight cars for other purposes such as transporting grain and government supplies. About 1100 cars have been distributed by the drive-away plan. Many of the drive-aways go to the storage houses of the company in Detroit, Grand Rapids, Chicago, Toronto and Buffalo. From 60 to 70 per cent of the company's production goes overland, many of the cars traveling from 600 to 700 miles.

The Hupp Motor Car Corp. has cut down its percentage of drive-aways. To equalize its distribution the company is giving dealers only a certain percentage of their quota.

Most of the output of the Paige-Detroit Motor Car Co. has been transported by railroad, the company having obtained a great number of cars. Only nine motor vehicles were sent overland from the plant last week. The company is making use of boats to take cars to Cleveland and Toledo, whence dealers can drive them home.

The Federal Motor Truck Co. is freighting trucks to the extreme East and West, but nearly all the nearby dealers are driving them overland. The company reports that many trucks are required to handle lumber around the shipbuilding centers, and is sending much of its production to these districts.

Fifty cars left the Cadillac plant last week. Most went to eastern points. The

Scripps-Booth drive-aways average four or five daily.

A drive-away of 250 cars was arranged recently at a meeting of 50 Overland dealers. Each of these dealers will supply drivers for all the cars allotted to him.

Three Military Roads for Ohio

COLUMBUS, OHIO, April 13—Ohio is to have at least three military roads, Governor Cox stated in an address Tuesday night at the annual meeting of the Columbus Automobile Club. He based this statement on information received from a Government official. The roads are the Lincoln Highway, the National Pike and a route along Lake Erie.

The Governor said the big improvement being made on the National Pike between Columbus and the Ohio River would be completed by August. Forty thousand trucks carrying provisions for the military forces will cross the state over the National Pike, he said.

N. A. C. C. Issues Loan Bulletin

NEW YORK, April 15—The National Automobile Chamber of Commerce has issued a bulletin suggesting a Liberty loan organization for factories. The described plan was carried out by a manufacturer belonging to the N. A. C. C., and as a result the expected subscription amount of the factory's employees was doubled.

Canadian Imports Total \$15,181,194

OTTAWA, April 15—Imports into Canada of cars, trucks, motorcycles and parts during 1917 amounted to \$15,181,194, and included 12,037 passenger cars. Practically the entire number came from the United States.

Duties collected on the cars etc., imported totalled \$5,272,388. Almost three-fifths of this is collected as custom duties on passenger cars, and it has been pointed out that if their importation is stopped Canada will lose almost \$3,000,000 a year.

The figures for 1917 follow:

	Value	Duty
Passenger automobiles.....	\$7,981,177	\$2,790,256
Commercial cars.....	423,824	148,338
Motorcycles.....	177,621	62,071
Parts.....	7,200,017	2,171,723

Calendar

ASSOCIATIONS

- April 15-19—Little Rock, Ark., United States Good Roads Assn. Sixth Annual Session.
- May 13-18—Cleveland. War Convention of Machinery, Tool & Supply Industry of the United States.
- June 3-4—Chicago. National Gas Engine Assn. Eleventh

- Annual. Hotel Sherman.
- June 5-12—Hot Springs, Va., National Assn. Automobile & Accessory Jobbers.
- June 17-19—Dayton, O., Society Automotive Engineers, Annual Midsummer Session.
- SHOWS
- April 16-20—Deadwood, S. D. City Auditorium.
- April 17-19—Davis, Cal., Tractor

- Demonstration. University of California.
- April 17-20—Calumet, Mich., Upper Peninsular Show, Copper County Automobile Dealers & Garage Owners' Assn., Colliseum.
- May 3-7—Lima, Ohio, Ohio State Automobile Assn.
- Sept. 23-28—Chicago, National Accessory Show for Fords, Colliseum.

ENGINEERING

- April 24—New York. Metropolitan Section, S. A. E.
- June 26-28—Buffalo, N. Y. American Society of Heating and Ventilating Engineers.
- Sept. 2—Cripple Creek, Colo. American Institute of Mining Engineers.